COAL AGE

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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, *Editor*

New York, March, 1933

It Can Be Done

THAT INJURY and death are not inseparable from coal mining is being demonstrated daily at a growing list of operations. During 1931, for example, the Bureau of Mines reports that 61 per cent of the bituminous workers were employed at mines in which there were no fatal accidents and that these mines produced 54 per cent of the soft-coal output of the year. Still more significant was the fact that these figures represented a substantial gain over the preceding year, when only 55 per cent of the men worked at mines free from fatal accidents and these mines contributed only 50 per cent of the national bituminous output. Such improvement should be a spur to still greater achievement.

Is Anything Airtight?

PILLARS, stoppings, and even mine roofs leak, making difficult the ventilation of mines, the extinguishment of mine fires and the prevention of the spontaneous combustion of such coal as is disposed to self-ignition. Investigations in England show that, under a $\frac{1}{2}$-in. water gage, a stopping 9 in. thick passed five times as much air after its mortar had been allowed to set and dry for two weeks as it did during the first 24 hours after its erection. By blowing rock dust on the face of another stopping composed of two 18-in. brick-and-mortar walls, the leakage was reduced to one-sixth at $\frac{1}{2}$-in. pressure and almost to one-eighth at 6-in. pressure.

Rock dust may quite possibly pay for itself in its air savings, for it blocks the air passages through the coal and prevents the oxidation of pyrite to a sulphate, which, being dissolved by water and thus removed, enables the air to pass more freely than ever through the pillar. By-products of rock-dusting include a lowered cost of ventilation, better illumination, stronger pillars and less acid water, and a degree of protection against spontaneous combustion where coal has that tendency. In cases where the dust is protected against wind—as in some cave holes caused by combustion—rock-dusting of surface cracks, subsequent to filling with clay, should be helpful in excluding air.

The Expected Happens

FAILURE of the two-man commission to reach an agreement on the question of wage rates in the anthracite industry was no surprise. The failure was inherent in the composition of the tribunal, where neither arbiter has a deciding vote and either one can block the appointment of a third member to break the deadlock. Union officials who met the whispers that the terms of the contract on this point, while permissive in language, were mandatory in effect, with eloquent denial that the union would submit wages and working conditions to independent arbitration demonstrated that they knew what they were talking about in 1926 and establish their mastery of the situation.

But it is one thing to win dominance and quite another to hold it. The history of the past decade in the bituminous fields, where the union empire has shrunk to a few provinces now retained only by concessions which union leaders scorned at the beginning of the dissolution of their control over soft-coal production, proves that. Evidence is not wholly lacking that there are local unions and groups in the anthracite region that find empty pay envelopes too high a price to pay for the maintenance of conditions which make profitable operation

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of many mines impossible in today's competitive markets.

Both members of the commission admit that the industry has fallen upon evil days. And both members of the commission invoke the industry to call upon the joint board of operators and union officials provided for in the 1930 agreement to find the way out. This is sound counsel, since an orderly solution of the many problems facing the industry can be effected only through genuine cooperation between management, union officials and the men. In closing the door to decisive arbitration, the union has assumed a responsibility for lower production costs through increased efficiency and the abolition of burdensome conditions which it cannot evade without imperiling the survival of its own organization in the anthracite region.

Cold Cash

SINCE compensation liability became a fixed part of the industrial set-up, there has been a steady and successful drive to widen the field covered and to increase the base rates for the individual accident. In many industries, an increasing number of ailments has been added to the list of compensable disabilities. The bill for compensable diseases, as distinguished from accidents, represents a substantial proportion of the total annual compensation payments by the British mines.

Coal mines in the United States have been relatively free from the burden of such payments, but this freedom rests upon no unshatterable rock. Some time ago, the Pennsylvania Workmen's Compensation Board upheld the finding that a miner, while cleaning up an abandoned working place, came in contact with red, muddy sulphur water and as a result contracted dermatitis, "which developed and caused disability approximately four months later." It is not outside the bounds of probability that the compensation awarded in that case will be used as a precedent for the extension of liability to cover other disabilities not now entering into the calculations of employers and insurance companies.

While there may be reasonable grounds for honest disagreement as to application in specific instances, the underlying principle will not be disputed. Neither, even if desirable, is it likely that the extension of its scope can be stayed. Therefore, to protect both himself and his men, the wise employer is going to insist still more rigorously on safe working places, safe working conditions and safe men. He is going to insist upon periodical physical examination of workers, not only to weed out those whose pathological conditions make them specially susceptible to accident or other compensable disability but also to guard against payment for disabilities which are not industrial in their origin.

Domestic Coal Economies

MUCH HAS BEEN SAID about the effect of industrial economies on the sale of coal, but domestic economies—probably almost as important — have come without comment and have had almost an equal effect on coal consumption. At one time nearly every family lived in a house exposed to the elements on all sides. Later houses were built forming part of a block, so that only the front and back were exposed. Soon after it became customary to divide the houses between tenants and to build them three, four or more stories high. Later came apartments, with several families on a single floor occupying one to, say, nine rooms.

As a final result, many apartments have but one exposure to the outside air and are protected from the winter's cold on the right and on the left, above, below and behind. With each of these changes came a decrease in the quantity of heat required, and concurrently with changes in house construction came increasing heat insulation, further reducing the demand for coal.

When the country prospers, families move into the suburbs, where detached houses permit the children to get out into the fresh air. Then the demand for coal increases, but when finances become straitened the trend is toward smaller quarters in the urban centers where commutation costs are avoided and where, because of the reduced space occupied, the rental cost is reduced. Such domestic realignments cannot fail to modify profoundly the economics of the coal industry, especially in its anthracite branch. In fact, a campaign in favor of more air, light and play space could not fail to increase coal sales.

ELECTRIC EYE

+ Opens Nemacolin Doors

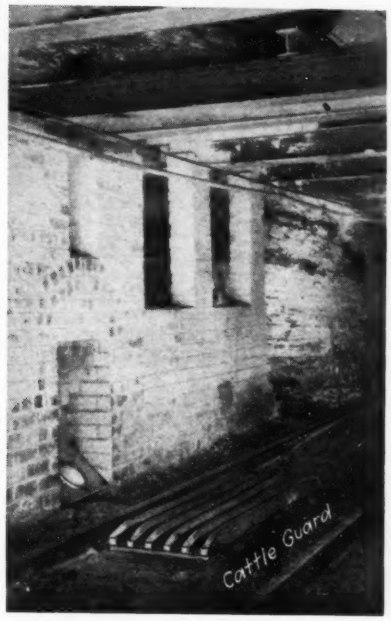


Fig. 1—Source of Light and Cattle Guard

TWO DOORS in the Nemacolin mine of the Buckeye Coal Co., Nemacolin, Pa., are being operated by the photo-electric device familiarly known as the "electric eye." As the locomotive and cars of a mine trip pass along the heading, they intercept a ray of light which is oriented and condensed to a point by a lens in the direction of a photo-electric cell, and the amplified effect of this diminished brightness on the cell breaks contacts by which indirectly one of the doors is opened. A similar interference with the light path of another lamp sets another train of sequences in operation, by which the door motor is reversed and the door is closed.

At Nemacolin are two entirely separate systems of ventilation, receiving their air from different sources and being set in operation by separate fans. Description of the ventilation set-up at Nemacolin can be found in *Coal Age*, Vol. 36, pp. 417-420. It is regarded as essential that each ventilation system shall be operated separately, because any other provision would make the direction of the air current uncertain, permitting either fan at times to draw from sections and in directions other than those projected and desired.

Where the car trip passes from one system to another, a dead-air section is provided long enough for the reception of a single trip, with some space to spare. The first door is opened, and the trip passes into the neutral or dead section, and the door is closed. Immediately thereafter the second door is opened, the trip passes through it without stopping, and the second door is then shut.

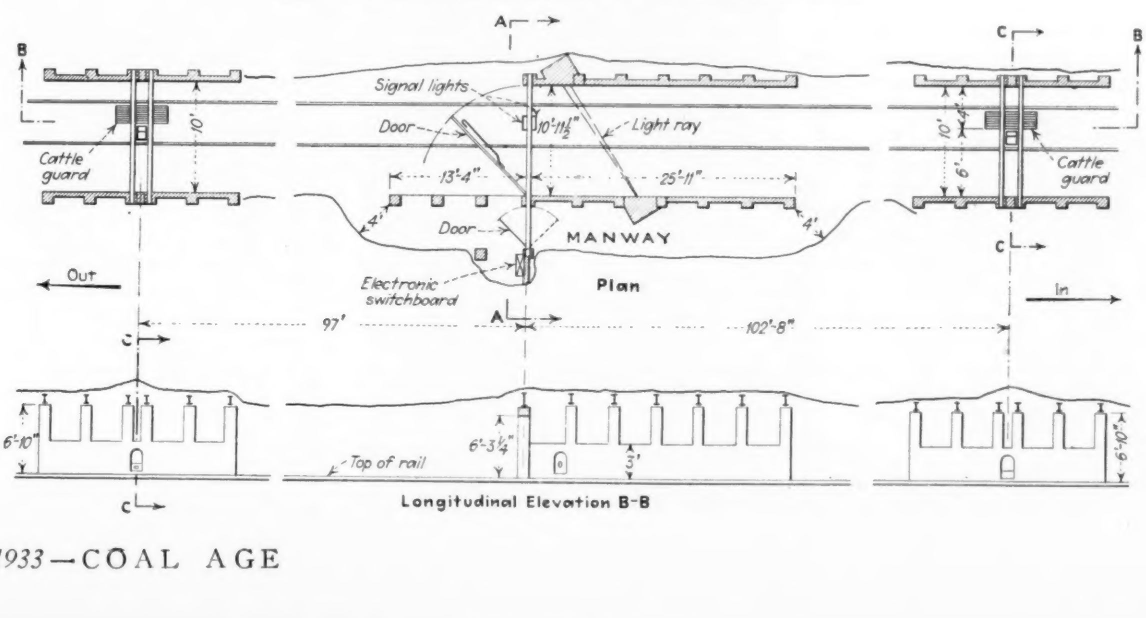
In order to save time and to avoid the stopping of the trip, and at the same time to provide an unquestioned sequence in the operation of the doors, the photo-electric method of actuation was introduced. An ordinary electric system might have been adopted, but, unfortunately, a track crossed the main roadway near the neutral zone, and the installation of electric wires for operating an ordinary electrically controlled door would have been equally costly and have occasioned greater difficulty. An electronic system of control offered a means of avoiding such wiring.

Among the difficulties to be solved were the discontinuity of the trip, the cars and locomotive not forming a continuous barrier to a ray of light if directed at right angles to the line of travel of the trip, and the danger that men passing along the roadway—and the road is used for such travel—would intercept the light, which would begin to open when the man passed the light and be closed long before he reached it.

To obviate the first difficulty, the light was thrown at such an angle that the line of the beam when projected on a horizontal plane would be at an angle of 45 deg. to the direction of the heading; thus the light could not fail to be intercepted by the rear end of one car or the front of another when the coupling between cars was actually abreast of the light.

To avoid the operation of the electric eye by passage of men, the lights were set near the floor recessed in a brick wall running along the right side of the roadway, and the electric eye was placed near the roof just a little short of the center of the heading. Thus a man,

Fig. 2—Plan of Neutral Zone Between Ventilating Systems



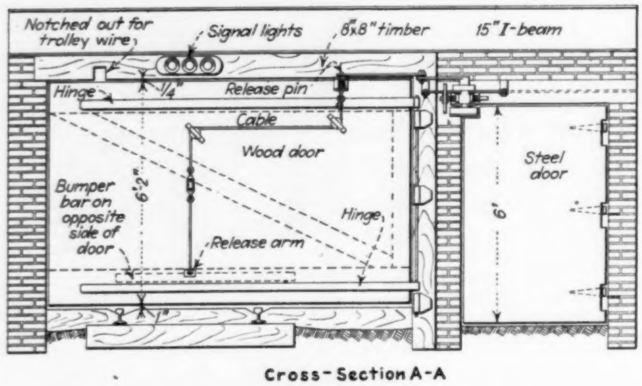


Fig. 3—Door Operated by Electric Eye

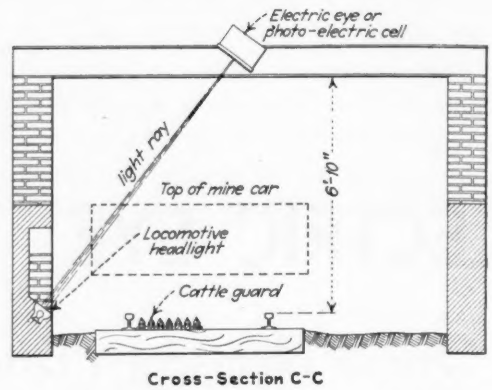


Fig. 4—Light Directing Its Rays on Electric Eye

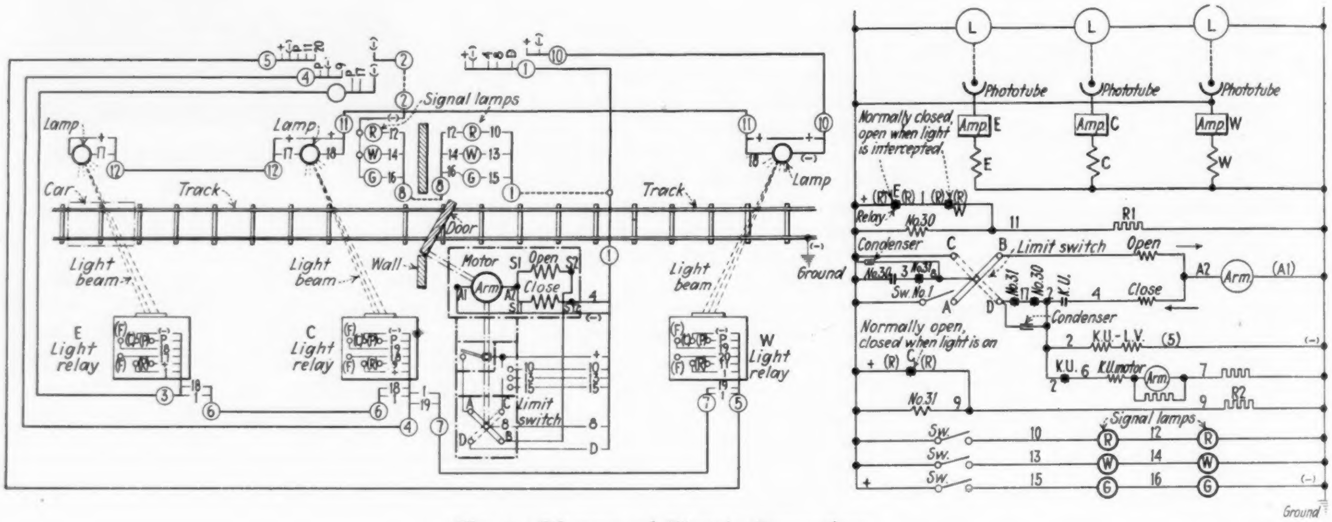


Fig. 5—Diagram of Electric Connections

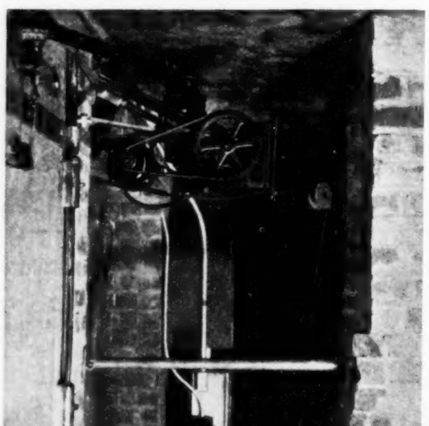
however tall, walking on the clearance side of the track, or even if 6 ft. tall and walking on that half of the track thereto adjacent, would not intercept the light with any part of his body; and to make sure that no one would attempt to travel on that half of the track adjacent to the tight side of the heading, that half was protected by a guard such as is used to keep cattle off the railroad track.

To enable men to pass the doors, runarounds were provided in the rib on the clearance side of the roadway at each door, and these were provided with small balanced doors through which the men could conveniently pass.

Obviously, lights and equipment must be, and have been, provided on each side of each door, so that the door will open regardless of the direction in which the trip is proceeding. A time switch is installed so that the door will shut after a short time should the trip stop short of that point. Another light has been added as close to the door as can be arranged, the function of which is to restrain the action of the time switch from closing the opening in the face of an advancing train.

This equipment is so timed that the locomotive will reach this middle light before the time switch gets into operation, the switch being prevented from functioning till the last car has passed the middle light, making it no longer necessary to keep the door open. In addition, a limit switch is provided to shut off the motor by which the door is opened as soon as it has fulfilled that function.

Fig. 6—Door Operating Mechanism



Thus there are, for each door, three lights—an east and a west door-opening light and a central light near the door to prevent a premature closing of the door in the face of the trip. These lights are in series between the trolley and the rail; in consequence, if one should fail, they will all fail together; otherwise, the motorman might pass the first light, which would open the door, only to have it closed on the trip as it passed through, because the second light having failed, it would not act to delay the action of the time switch. The lamps will give best results when run at 83 volts per unit, but they will perform their function with the voltage greatly reduced.

In approaching the door the locomotive in the front end of the trip intercepts the light beam as it travels to relay *E* (see Fig. 5). This opens contact *E* (which normally is closed) and so provides a passage for the current around coil 30, energizing that coil, thereby closing contact 30 and completing the current to the limit switch from *AB* to

(*Turn to page 81*)

PREPARING COAL

+ For Western Markets

AN UNUSUALLY critical trade is served by the Carbon County coal field in Utah—a trade that lays particular stress on the preparation of the product. A large percentage of the tonnage goes to Pacific Coast points where freight rates are from $5.50 to $6.50 per ton. Buyers consistently refuse to pay these high freight rates on coal that is not properly prepared and loaded free from degradation.

Thus, two thoughts are paramount in the minds of Utah operators when considering preparation-plant design: First, to afford adequate facilities for efficiently producing the large number of sizes and mixtures demanded by their market and, second, to provide means for mechanically loading the product in railroad cars with degradation reduced to the lowest possible minimum.

In general, the coal is low in ash and does not, to any serious extent, become mingled with impurities in mining. In order to keep the coal free of extraneous material, a few inches of the seam is allowed to remain on the floor of the mine at all times, with a larger quantity on the dip side of the room, for the rooms and pillars lie sideling to the inclination of the seam. This is left to bring the working place more nearly to a level; enough merely to allow the free working of the shovel loader. Usually, on top of the seam is found a white sandrock from which the coal parts freely. The bed is mined, in most cases, in two benches, the lower first; thus mined, the coal is protected from any possible infiltration of roof material.

Visual inspection and hand picking are used for cleaning by the Independent Coal & Coke Co., Kenilworth, Utah, in the new preparation plant which was placed in operation late in 1931. Because of the very low percentage of free impurities loaded, it is not thought that mechanical cleaning would result in any marked advantage.

Coal is brought to the tipple in cars carrying an average of 3½ tons. The gradient in the tunnel is 1.7 per cent and from the dump to the tunnel by which the mine is entered is 2.5 per cent, so squeeze blocks are used to control the cars as they enter the dump, should they assume too great a speed. Formerly made with wood planks that pressed on the wheels on either side of the car and operated by hand, they are now operated by air, and steel rails are used in the construction, air being more effectual and the use of steel making replacement less frequent. Steel blocks do not give as frictional a grip as the old wood planks, but the lower resistance is corrected by lengthening the blocks.

A full-revolving dump with automatic frictional and magnetic stop, built and installed by the tipple contractor, turns one car after another, discharging the coal. Some time later, the cars will be provided with swivel couplings, but at present they are uncoupled prior to dumping. A car feeder, under the control of the dump operator, brings the cars almost to the dump, which they enter by gravity. A 2½-per cent gradient on the dump enables the cars to float away by gravity.

Thus emptied, the cars go to an elevated back switch, returning past the dump, and are retarded by an air-operated squeeze block on a 1½-per cent gradient that stops them gradually. There they are coupled and dropped by gravity to a point where the locomotive can pick them up and take them back into the mine. The locomotive, it may be added, leaves the loads as soon as they enter the first squeeze block and, taking a switch past the dump, proceeds over to the empty track to pick up the empties from a previous trip and hauls them back to the mine. The delay at the surface, therefore, is negligible. About five cars are dumped per minute.

As the cars are not all of the same standard of construction and size, the coal is weighed in a weigh basket, giving the loaders accurate weight for every car loaded. The discharge door of this weigh basket is operated by air.

After weighing, the coal goes into a reciprocating feeder which passes it over a shaking grizzly of steel rails set at spacings of 12 to 14 in. Large lump coal, which passes over the grizzly, is delivered to an apron conveyor which is used as a breaking table. This conveyor is of unusually sturdy construction, having aprons of cast steel.

In order to make as little slack as possible—the fine coal moving with difficulty on the market—the lumps on this breaking table are broken down to about 12-in. cubes. Ingersoll-Rand "concrete breakers" and "coal snubbers" —the former preferred—are used for breaking. This method of splitting the large lumps is well suited for the coal from this mine, which, being loaded by Goodman loading machines of the shovel type, give occasional lumps weighing as much as 3½ tons, though

Kenilworth Tipple of Independent Coal & Coke Co. Has a Capacity of 1,000 Tons Per Hour

only rarely are they so large. Crushers are likely to make too much coal of small sizes, and therefore their use has been avoided. No cleaning is done on the breaking table.

Inasmuch as the breaking conveyor can be run at two speeds, time can be provided, in case the coal happens to run excessively large and beyond the capacity of the one man who is always located on a platform above the coal to be broken, so that his work will entail minimum exertion. A power pick gives better results than a sledge and does the work with more certainty and rapidity and with much less degradation.

The smaller coal, which goes through the shaking grizzly, is delivered to a scraper-type conveyor, the receiving end of which is directly under the breaking table, and this scraper conveyor, in receiving the broken coal from the breaking table, delivers the combined product to the main shaker screen. The coal is then sized on this screen, the smaller size being removed first.

This shaker screen is one of the largest, if not the largest, ever operated for sizing coal. It is 10 ft. wide by approximately 120 ft. long and runs in two balanced sections. Its upper section has three screening decks and one dead-plate deck. Sizes made are: slack (coal under $1\frac{5}{8}$ in.), pea (between 1 and $1\frac{5}{8}$ in.), nut ($1\frac{5}{8}$x3 in.), stove (3x8 in.), lump (6x10 or 8 in. plus). The shaker screen is equipped with the necessary number of gates to regulate sizes made, mixture of sizes and quantities of sizes. All the screens have round holes, that being standard practice in the Utah field.

Slack coal also is produced by the main shaker screen down to minus 1 in., the minus 1-in. material going direct to the car or being taken, if finer sizing is desired, to the Hum-mer screening plant located downtrack. The minus $1\frac{5}{8}$-in. coal also may be directed to this plant, the coal being delivered thereto by a 48-in. wide belt conveyor. By the Hum-mer screens, $\frac{3}{4}$x1-in., $1\frac{3}{4}$x$1\frac{5}{8}$-in., or minus $\frac{3}{4}$-in. coal is made. Instead of using the usual round-rod or pipe construction, the connecting rods of the eccentric drive which actuates the main screens are constructed of two 12-in. channels set back to back.

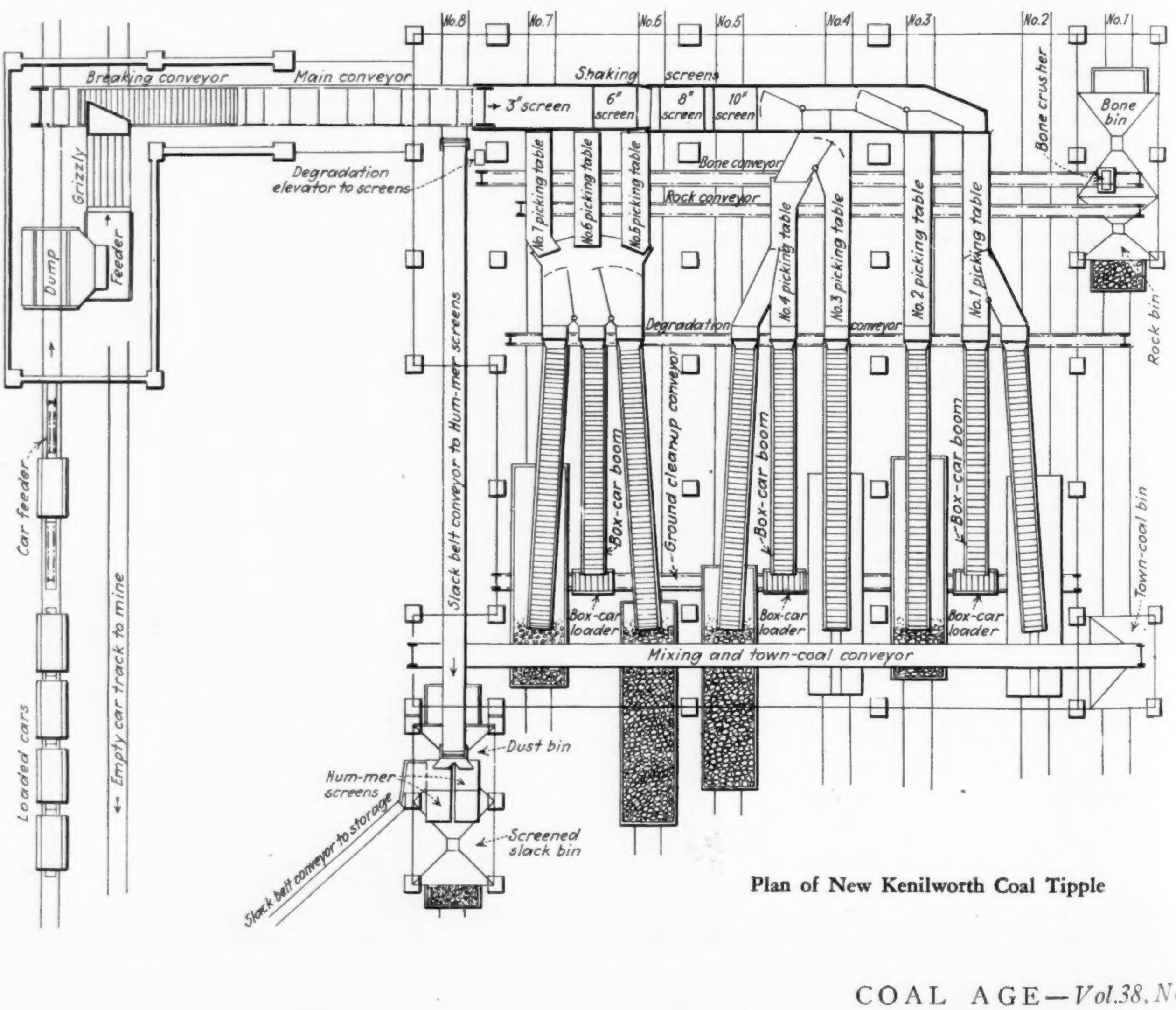
Run-of-mine, as it contains a very small percentage of impurities, is not subject to any preparation or hand picking, and is delivered direct to railroad cars through a 48-in. round steel pipe which receives the product directly through a gate in the bottom of the main conveyor.

The various prepared sizes are delivered to six shaking picking tables, which include one for lump, two for stove, two for $1\frac{5}{8}$-in. nut and one for 1-in. pea coal. Generally two men are used on the lump table, two on the stove table, two on the nut- and one on the pea-coal table. The speed of the coal on the picking tables is regulated by the variable throw of the eccentrics. Consequently, the coal will travel at the speed which will guarantee most effectual picking.

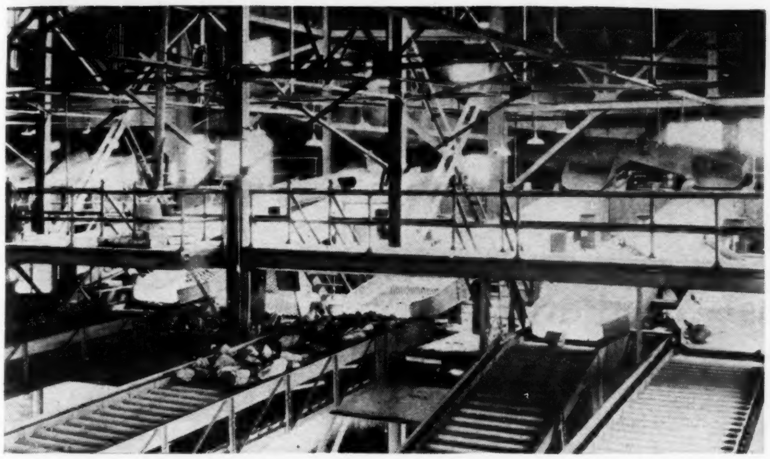
Freedom from degradation being regarded as most important in the preparation of this coal, degradation screens are provided in the ends of the picking tables to remove undersize, which undersize drops into a degradation conveyor below the end of the picking table. This undersize coal is delivered back to the upper end of the main shaking screen for resizing. Thus, all prepared sizes are delivered to loading booms entirely free from degradation.

Bone and refuse taken from the picking tables are dropped into pockets and carried by separate conveyors, one delivering to the pure refuse bin and the other to a boney bin. The boney coal is used largely for local consumption.

Diversion gates are placed at the end of each picking table, just above the degradation screens, for the purpose of deflecting coal either to the booms for



Plan of New Kenilworth Coal Tipple



Interior View Showing Part of Main Shaking Screen and a Few of the Picking Tables and Booms

loading gondolas or hoppers or to other loading booms delivering to Manierre box-car loaders. The ends of the box-car loading booms have cross conveyors for delivering the coal to the box-car loaders and these cross conveyors and booms, operating as individual units, may be raised and lowered by a hoist to suit the exact elevation required for the delivery of the coal to box cars. These cross conveyors have perforated screen bottoms for removing any final small degradation just before the coal is delivered to the box-car loaders. The degradation so produced falls to an underground degradation conveyor and is delivered to the regular degradation collection conveyor, which finally returns it to the main shaking screen.

In the winter, about one-third of the coal shipped is in box cars, partly to avoid theft and partly to enable the small local coal merchant to serve his trade from a box car. The long distances the coal has to be transported—often over one thousand miles—with the possibility of the shipments being side-tracked in towns along the route, make it relatively easy, for those who will, to steal coal from open cars for their own consumption. For these reasons the demand in the West has favored the use of box cars for coal transportation. The Independent mine uses three Manierre loaders, each located between two tracks. As they can load to the left or to the right, at pleasure, box cars can be loaded on any of six tracks. The shuttling conveyors on the ends of the box-car loading booms shuttle in and out of box cars by power and are reversible, thus permitting delivery of coal to box-car loaders on either track.

To afford space and freedom of movement for these various pieces of equipment, the tipple is built with heavy truss construction, so that there are three spans of 34 ft. 9 in., 35 ft. and 36 ft. respectively, measured from center to center of columns, and affording ample space for two tracks between each set of columns, the overhead clearances nowhere being less than 16 ft. 6 in. There also are two additional passageways underneath the tipple; one for refuse and rock, 15 ft. between column centers, and one for slack, 15 ft. 3 in. between centers. In all, there are eight tracks under the tipple with a run-around track for serving cars.

Cars passing through for loading are handled by Pittsburg electrically controlled car retarders with the aid of General Electric "Thrustors", which are operated from the central pushbutton station on the floor above the loading booms. The Thrustor is a motor which, when a car needs moving, will lift the brake arm of the car retarder and thus release the brake. The gradient under the tipple is 2.75 per cent and below is 1.50 per cent. Arrangements are made for ground storage of slack, the coal being taken from the Hum-mer screen plant by a 30-in. belt conveyor.

Provision is made for the mixing of sizes by the introduction of a scraper-type conveyor, 36 in. wide, which runs along the delivery ends of the main booms, receiving coal from these booms through automatically operating chutes and delivering, by chutes, the mixed products to railroad cars. However, practically all the mixing is done at the main screens. The mixing conveyor also is used as a means of delivering coal to the town coal bin.

Much of the refuse and bone from the plant, which is of relatively high quality, is used in the company's boilers. The entire physical operation of the plant is under the control of one man at a central station where he can see the railroad cars, box-car loaders, picking tables and screens.

With large skylights and the brilliant Utah sun, the picking tables are well illuminated by natural light. As the canyon is wide and has an east, west and south exposure, the tipple is never shaded. During the winter months, the mine may work long hours, and artificial light is then necessary. For this purpose, three 250-watt lamps are located about 5 ft. above each table.

This entire 1,000-ton-per-hour plant, including the rotary dump, was designed and erected by the McNally-Pittsburg Manufacturing Corporation. It embodies many new ideas of the general manager of the coal company, J. B. Marks.

▼

Electric Eye Opens Mine Doors

(Concluded from page 78)

CD, which in turn opens the circuit to the motor and resets the control for the closing position. This then starts the KU time relay functioning, but its time delay is so adjusted that the locomotive, if it travels steadily forward, will intercept the beam of light *C* and break the circuit to the KU time relay, holding it thus broken till the last car clears this light, which is stationed close to the door, which the motor then closes. Switch No. 1 bridges contact 30, so that beams of light *E* and *W*, if intercepted momentarily, do not respond to the impulse.

Three signal lights are provided: red, green and orange. Red shows that the door is closed, green that it is open, red and orange that the door is closing, and green and orange that it is opening. The door used is of single-valve type, opening from hinges on the clearance side of the track. By the means described, without relying on human hands, the locomotive and its trip can pass through the doors and the neutral zone without slackening speed and without losing time and energy in deceleration and the subsequent attainment of speed. In this way, the capacity of the haulage is increased, energy is conserved for other uses, and the equipment, not being subject to so many checks and collisions, is given a longer and more efficient life with a decrease in maintenance charges. The use of the electric eye for this purpose was suggested by C. M. Lingle, vice-president, Buckeye Coal Co., soon after the device was first conceived. The electronic features were provided by the Westinghouse Electric & Manufacturing Co., and the door-opening devices by the Automatic Mine Door Co.

ANTHRACITE

+ Battling to Regain Lost Markets Takes the Dealer Into Partnership

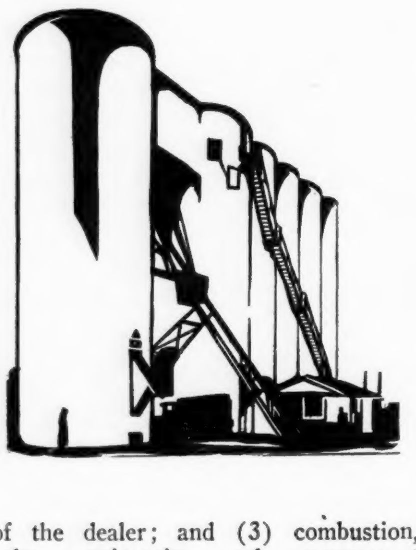
By IVAN A. GIVEN
Assistant Editor, Coal Age

WITH the passage of the five-months strike of 1925-26 into history, the anthracite industry found itself faced with the problem of regaining tonnage lost to fuel oil, soft coal and gas during the course of the stoppage. Bereft of its dominating position in the immense fuel market embraced in eastern anthracite-burning territory by these late but lusty contenders, though still the major factor, anthracite is now forced to battle substitute fuels in its own stronghold with the best weapons it can develop.

The changing picture in anthracite has taken the retailer off the dole and made him a major factor in anthracite's battle. As the only contact between the producer or wholesaler and the ultimate consumer of by far the major portion of the hard-coal output, the success of the dealer is inevitably a measure of the success of the industry. Any new weapons developed to combat substitute fuels, therefore, must be fashioned with the retailer's needs in mind, and the producer or wholesaler must accept his share of the responsibility for the eventual success or failure of the fight.

That the industry, in spite of the heritage of tradition from the old order-taking days, is accepting the responsibility is evidenced in the merchandising programs adopted in late years. In this and the succeeding article, the place of the retailer in the new scheme of things will be set forth in the light of the merchandising programs of the following anthracite companies: Hudson Coal Co.; Madeira, Hill & Co.; Weston Dodson & Co., Inc.; Dickson & Eddy; Delaware, Lackawanna & Western Coal Co.; Thorne, Neale & Co.; Coleman & Co.; Lehigh Valley Coal Sales Co.; Pattison & Bowns, Inc.; Payne Coal Co.; Philadelphia & Reading Coal & Iron Co.; and the Lehigh Navigation Coal Co.

In general, merchandising activities carried on by the producer or wholesaler primarily for the benefit of the retailer fall into three classes: (1) advertising and sales promotion work carried on by the producer or wholesaler to supply a background for the efforts of the individual dealer; (2) advertising and sales promotion material developed by the producer or wholesaler for the use



of the dealer; and (3) combustion, sales, engineering and management services made available to the retailer by the producer or wholesaler. The latter, while not a direct part of advertising and selling, are nevertheless offered with the thought that they will help the dealer use the other services more efficiently, with consequent improvement in sales.

Table I shows in condensed form the salient points in the merchandising programs adopted by the twelve companies for the assistance of their retail dealers. Examination of the table shows that the majority of the companies place the most emphasis on sales promotion material for use by the dealer, and on combustion, sales, engineering and management services. The important place that combustion service to the consumer holds in merchandising is evidenced by the fact that all of the twelve companies have made this work a part of their merchandising programs.

The list of companies which carry on general advertising as a basis for supplemental efforts by the dealer is somewhat less in number. This, however, is no indication of lack of interest, as nearly all of the companies included in the survey have considered general newspaper campaigns and radio advertising at one time or another, and some sales executives go even further to advocate the adoption of a cooperative newspaper and radio campaign by the entire anthracite industry.

Out of the four producers or wholesalers that use newspaper advertising, two limit their efforts to special campaigns, usually local in character and designed for some specific objective, such as the introduction of the company's product into the community or the meeting of special competitive conditions. Two other companies, however, use space throughout the entire area in which their product is distributed, and have coordinated their newspaper work with radio campaigns.

The majority of the companies studied take the position that direct-mail work is more properly within the province of the dealer, and those who have undertaken this work rely on their dealers for the necessary lists. In the case of two companies, direct-mail work takes the form of letters to consumers over the signature of the president. These are sent out only at the request of the dealer and, of course, include the information that he is in position to supply the consumer's wants. A third com-

pany, however, undertakes to do all the direct-mail work for its retailers, who are required to defray only the cost of the postage. The campaign provides for a general mailing once a month to the entire list of customers and prospective customers of the company's dealer for nine or ten months out of the year.

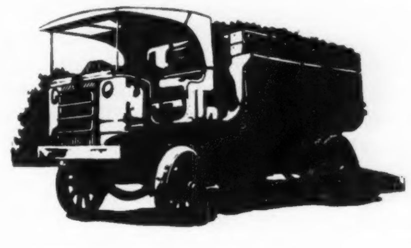
None of the twelve companies included in this survey does poster work, though at least one anthracite organization not covered has made posters a part of its advertising program for some time. In addition to the general classes of advertising listed in Table I, one of the companies has carried on car-card campaigns in certain of its market territories.

Of the several organizations which have adopted general advertising programs, two furnish outstanding examples of the coordinated use of newspapers and the radio for the preliminary work of attracting the consumer's attention and arousing his interest, both for the ultimate purpose of creating a desire for the products of these particular companies on which the dealer can capitalize. One hundred and thirty-nine newspapers in the eastern anthracite-burning territory north of Richmond carry the story of one company's coal for nine months out of the year—June, July and August excepted. In general, these newspapers serve communities of 10,000 or more. Size, however, is not the absolute criterion for the selection of a particular paper, or for the number of insertions per week, these being dependent upon the presence of a dealer handling the company's coal in the community, tonnage consumed, tonnage handled by the retail merchant, possibilities of extending sales and other factors.

Paralleling its newspaper campaign, one company offers two half-hour radio programs a week to insure that every possible person has a chance either to hear or read of its coal. One program goes out over eleven stations of the National Broadcasting Co., and the other over twelve stations of the Columbia system. Both programs are continuous from October to April, and in the winter feature talks on firing, draft control and other practical points in heating-plant operation for the use of the householder. At the end of the coal-burning season, listeners are urged to have their heating plants cleaned and put in shape for the next season. At all times during the year, the householder is urged to take advantage of the coal merchant's service facilities, and this admonition also is carried in the newspaper advertisements.

The general practice of all companies using newspaper advertisements is to list the names of the dealers in the communities served by the paper. This, of course, is impossible over the radio, and was the reason for the discontinuance of radio work by one of the companies included in this survey. One company, however, overcomes this objection by urging listeners to consult the classified telephone directory, where dealers are listed under the trade name of the coal. Newspaper advertisements also are keyed into the classified directory by a line telling readers that other retail merchants handling the coal, in addition to those mentioned, can be found in the directory under the trade name of the product.

The advertising program of another company is based on the use of 347 newspapers throughout its distribution



territory, supplemented by a radio program over one of the broadcasting networks. The newspaper campaign provides for both regular winter programs and for special summer campaigns to stimulate buying in the warmer months. All sizes of advertisements and a wide variety of insertion schedules are included in the newspaper program to fit competitive and consumption conditions in the various market territories.

The various consulting services offered to coal merchants, as shown in Table I, range from combustion service to credits and collections. In addition, the majority of companies are prepared to assist the dealer with special advertising and merchandising problems not covered in the standard services. Organization and operation of the combustion services offered by the various wholesalers and producers is influenced by the sales problems, tonnage, resources and merchandising philosophies of the various companies. However, while the various plans may differ widely in organization and practical application, they all are based upon the premise that servicing the consumer's equipment is properly a dealer activity, and that the major responsibility of the producer or wholesaler lies in training the dealer's staff to carry on the work. As a rule, actual service calls are not made, unless the complaint lies beyond the retailer's experience or facilities.

The personnel of the various service departments varies roughly in accordance with the tonnage handled by the company, and ranges from one practical fireman to specially trained service men stationed at each branch office of the larger companies. In the case of two of the companies studied, no service men at all are employed, the salesmen being trained to take over this activity.

Table I—How Twelve Producers and Wholesalers Help the Dealer Sell Anthracite

Explanation of symbols: M, major plank in program for assisting dealers; L, special or limited advertisin and consultative programs

	Company											
	A	B	C	D	E	F	G	H	I	J	K	L
Newspaper advertising			L	M					M			L
Direct mail	M						L	L				
Radio				M				L	M			
Advertising Material Supplied to Dealers												
Newspaper	M			M			M	L	M	L	M	M
Direct mail	L			M			M	M	M	M	M	M
Radio				M			L					
Combustion, Sales. Engineering and Management Services												
Combustion service	M	M	M	M	M	M	M	M	M	M	M	M
Sales training				M				M			M	M
Stoker merchandising*	M		L	M							M	M
Stoker plan†								M				
Buying service‡		•		M					M		M	
Yard management	M			M			M	M	M		M	M
Cost-accounting	M			M			M	M	M		M	M
Credits and collections	M			M			M	M	M		M	M
Special advertising or merchandising help			M	M			M	M	M		M	M

*Limited to the following: special assistance to the dealer in the development of stoker merchandising plans for his own use; general information on stokers and stoker problems, usually derived in company's own research laboratory.

†Definite stoker sales program built around a stoker or stokers selected by the company, which shares financial and/or merchandising responsibility with the dealer.

‡Covers purchases by dealers at cost of the following: novelties, mats of advertising matter, uniforms, badges, stationery, weight tickets, coal bags, trestle signs, truck billboards, decalcomanias, electric signs, window display material, and similar items.

As indicated above, the primary job of the service men is training the dealer's staff and organizing his service program. This is particularly true of the larger organizations, although, as pointed out above, all service men stand ready to take over any complaint beyond the dealer's knowledge or resources.

Recognition of the fact that efficient selling and servicing must be based upon a thorough knowledge of the characteristics and operating performance of the company's product in various types of equipment and under various conditions, a number of producers and wholesalers have set up their own research and testing laboratories. Five companies, for example, have provided facilities for analysis of their coal as a means of controlling uniformity of quality and sizing, and also are equipped to make combustion tests with various types of heating and firing equipment to determine the types of coal best suited to each. The results of these tests are used by the company's sales and service organization, and also are made available to the dealers. A further activity of several of the company research laboratories is the development of coal-burning equipment and heat controls for the more efficient utilization of anthracite.

Supplementing the work of their sales and service men, a few anthracite companies have established training courses in sales and service at their laboratories. One company, as an example, gives two courses at its plant, one of which, a short sales and service course, requires four days. The other, a complete service training course, requires two weeks, and covers all the ramifications of the subject. Another anthracite organization has inaugurated a special course of two weeks in either general combustion service or the servicing of stoker-equipped heating plants.

While the promotion of stoker sales is regarded by the anthracite industry as one of the best methods of combating substitute fuels, there is a wide difference of opinion among various companies as to just what form the assistance of the industry should take. A number of producers and wholesalers included in this survey take the position that stoker sales are a problem to be settled by the manufacturer and the individual retailer, if the latter should decide to add this equipment to his line.

Another major group of anthracite companies, however, takes an active interest in the encouragement of stoker sales by retailers, and undertakes to supply specific information on the merchandising and mechanical aspects of automatic heat to interested coal merchants. The majority of these organizations develop information on the operating characteristics of various types of coal burners in their own laboratories. This material is made available to interested retailers, and they are

invited to send their salesmen and representatives to the laboratory for training.

To round out their automatic heat programs, some of these producers and wholesalers supply automatic-heat advertising programs and help dealers draw up special merchandising programs to fit their own particular requirements. One company's advertising program comprises three folders and a twelve-page booklet. These pieces may be used either as envelope enclosures or for special mailing to selected prospects financially able to install this equipment. Both the booklet and folders discuss stokers and heat controls in understandable terms, and urge the reader to consult with the retailer, who will supply full details without obligation.

A complete heat merchandising plan in which the wholesaler assumes a major part of the financial responsibility has been adopted by still another organization. This company, after a series of tests, selected two types of stokers as a basis for its automatic heat program. Either type will be supplied to dealers who decide to add this equipment to their line. The plan provides for the sale of stokers to consumers for cash or on time. If the sale is made on a time basis, the wholesale company takes the paper off the dealer's hands, thus relieving him of the responsibility for financing and collection.

One of the salient features of the plan is that this company guarantees to the dealer for two years a definite price on stoker coal (buckwheat or rice). This, in turn, enables the dealer to guarantee a fixed price to the customer for the same period, or long enough for him to pay for the equipment on the installment plan. The price to the customer covers the cost of the coal, delivery, maintenance of the equipment and other services, so that the consumer need not visit his heating plant at any time. The guaranteed price, however, is based on the consumption of a certain fixed tonnage to avoid the wasteful use of fuel by the consumer. If the fixed tonnage is exceeded, the consumer pays for the extra coal at the regular price, less the service charge. If consumption is less than the fixed tonnage, the customer receives a rebate on the same basis.

To assist the dealer in the preliminary work connected with the installation of the stoker plan, a company service engineer is sent out to explain the plan in detail and install the first three machines. The latter is done with the help of the dealer's staff, who get their training in this way. The dealer also receives special help in developing a sales campaign to meet his own particular conditions.

The buying services established by the various companies are based on the economies growing out of quantity purchases which result from pooling the requirements of a number of dealers. By combining the orders of his various dealers, the producer or wholesaler can obtain material reductions in unit costs, and these reductions are passed on to the coal merchants. The scope of the buying services is indicated in Table I.

Losses due to degradation, the handling of coal through the yard, laxity in the extension of credit and inefficient or unsuitable bookkeeping systems may materially reduce, or even wipe out, the retailer's margin. To assist the dealer in overcoming these conditions, the majority of the twelve companies offer special consulting services covering: yard management, degradation, losses in handling, construction of new plants, simple and efficient cost accounting, and credits and collections. These services, in most cases, are free to the dealer. In addition to the above, one company offers assistance in appraisals and traffic problems.

The third major activity in the programs of the twelve companies included in this survey—the development of advertising material for the use of the coal merchant—will be discussed in the second installment of this series of articles, to appear in an early issue of *Coal Age*.

Correcting the Record

In the summary of new preparation-plant construction in 1932, which appeared on p. 57 of the February *Coal Age*, the Pittsburg & Midway Coal Mining Co. plant at West Mineral, Kan., was incorrectly credited to the McNally-Pittsburg Mfg. Corporation. This contract was awarded to the Roberts & Schaefer Co., which designed the plant and supervised its construction.

STRIP-PIT SHOOTING COSTS

+ Cut by Horizontal Drilling

By R. DAWSON HALL
Engineering Editor, Coal Age

COAL stripping, which, in earlier years, was conducted solely in relatively loose surface material, such as loam, sand, gravel and glacial drift, has now reached such depths that shale, sandstone and even limestone often have to be shot and excavated. For this reason, horizontal drilling for shots has been introduced and is rapidly replacing vertical drilling. One of the early innovators in this direction was the Enos Coal Mining Co. at Oakland City, Ind., which also was the first to make use of liquid-oxygen explosives in coal stripping.

Among the many advantages of the new practice may be mentioned the following: (1) saving in the quantity of explosives used, regarding which more will be said later; (2) reduction in the number of holes drilled and greatly increased speed of drilling; (3) ability within limits to choose the rock in which the holes are to be drilled; (4) opportunity to lift the overburden vertically and let it drop back into place instead of being thrown out into the strip pit to bury the uncovered coal and tracks, as occasionally happened when vertical holes were used, if extreme care was not taken to avoid such an unfortunate occurrence; (5) elimination of pipe lines and pumps in drilling, as the horizontal drills operate without the use of water, troubles from frost in freezing weather thus being eliminated; (6) elimination of casing in the drilling of shotholes, as the work is wholly in rock, vertical holes occasionally having to be cased through surface material, such casing being left in place until the hole is shot, during which action it is so badly mauled as to be of value only as scrap.

Furthermore, with horizontal drilling, costly transportation of drilling machines and explosives over the rough terrain is avoided; drills are placed on the firm, even coal surface, and placements do not have to be excavated for the drills on the uneven natural ground by which the pit is surrounded; drills being operated without water make no slimes to dribble down the high wall onto the coal as they do with vertical drilling, unless they are carefully held in a suitable place by dams; these slimes freezing on the exposed portions of the coal bed in wintry weather, resisting removal by the bulldozer and later being loaded by the coal shovel and being removed at the tipple from the coal only with difficulty.

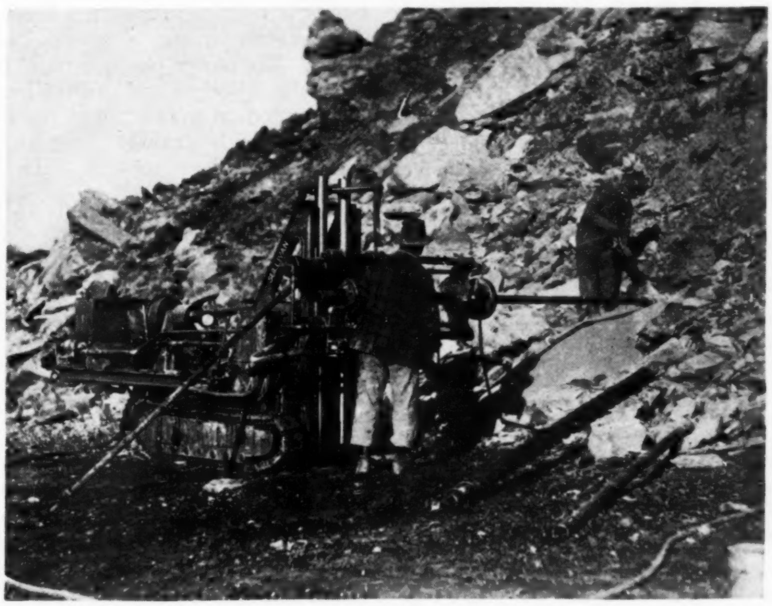
Other advantages with horizontal drilling are that the level of the drillhole with respect to the top of the coal bed is definitely assured, whereas with the vertical drilling machine the hole may be extended too near or even into the coal bed, resulting in the blast reducing some of the coal to unsalable dust, and also that, in even the most uneven terrain, the holes can always be placed precisely at the point desired.

With horizontal drilling, because the explosive is disposed between the remote end of the hole and the toe of the slope, from which it is separated by only the length of the stemming, no unshattered toes of rock are left at the foot of the high wall. These the shovel can handle only with difficulty, if at all. This latter possibility is reduced with vertical drilling by making more frequent holes, but that in turn increases the drilling cost.

Another advantage of the horizontal hole is that the drill works in the pit, where the operations are under supervision and where the men are readily available if they temporarily should be needed elsewhere. Dry material from the drillhole is always available for stemming. With the vertical hole, surface material was used, the digging of which occasioned some trouble when the surface was frozen.

A disadvantage with the vertical drillhole is that, to preserve the high wall of the pit from being overturned by blasts, each round of holes has to be drilled back of another round already drilled for an earlier blast and not yet

Fig. 1—Machine Making Horizontal Hole in Overburden.



loaded. The explosion of the charges in the earlier round may distort the holes of the other round so that some of them, at least, will have to be redrilled. With horizontal holes, no holes are placed behind those to be blasted, and though the end of one round of holes is near the end of another round, only one hole in any round of holes is likely to be affected, and none at all if each round is shot immediately after completion. At one time at Enos, two vertical-drill rigs were kept solely for the reopening of holes blinded by the shooting of near-by holes.

At the Enos stripping, the horizontal holes are made 45 ft. long, or slightly longer, and the holes are set 20 ft. apart. With vertical drilling, the holes were set 18 ft. apart in a direction parallel to the high wall and 20 ft. apart in a direction at right angles thereto. Thus each vertical hole shattered the cover over an area of 18x20 ft., or 360 sq.ft., whereas each horizontal hole breaks the overburden over an area of 20x45 ft., or 900 sq.ft., the loading being the same—a theoretical saving of 60 per cent.

Fig. 2—Three-Wing High-Center Bit.

From the figures in the table it will be seen that 231.41 per cent more feet was drilled at the Enos stripping per hour with horizontal drilling and that 132.94 per cent more cubic yards was displaced per cartridge.

Holes are charged with a number of cartridges of liquid-oxygen explosive, depending on the depth of the cover. Fig. 3 shows an actual round, the numbers stated under the several holes showing the number of liquid-oxygen cartridges in each hole. After the bags of explosive are inserted, ten bags of drillings usually are added to close the hole on detonation. It will be seen that the number of cartridges of explosive is varied to suit the thickness of cover but also in accordance with the nature of the rock. Where the limestone thickens—and in one place it is 6 ft. thick—the charge has to be unusually heavy.

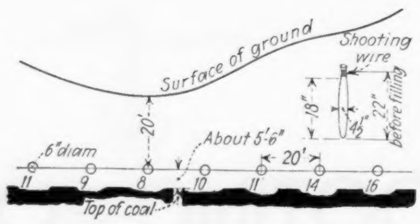


Fig. 3—Arrangement of Horizontal Boreholes With Loading; Sketch of Tamping Bag.

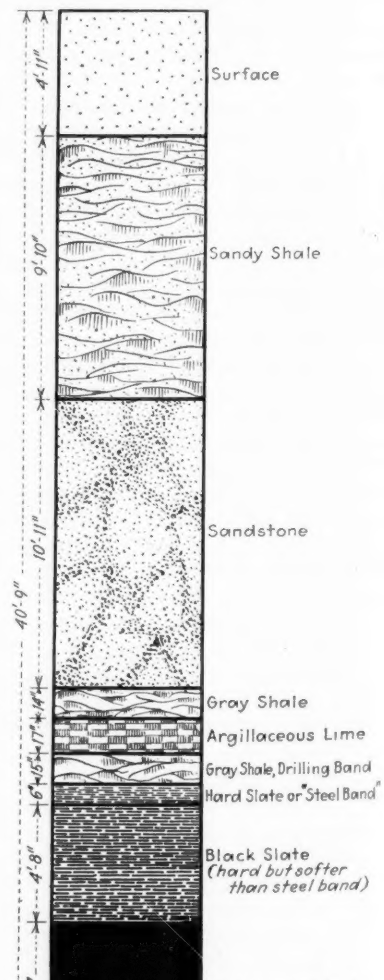
All horizontal holes are drilled in the gray shale which is here 5 ft. 2 in. above the coal. The machine which is known as the Sullivan Stripborer drill will place the drillholes from 2 to 6 ft. above the floor of the pit, which is, of course, the top of the coal bed. The equipment consists of a drilling head which rotates the drill steel or bit in the hole; the drills, which are 14 ft. or shorter, being handled by a "Kelley," or drive, rod 14 ft. long with notches every 20 in. The drill is fed by twin oil cylinders, 30 in. long, which exert on the drill a pressure of 5 tons. By manipulating suitable inlet and outlet valves, the drive rod is advanced or withdrawn as rapidly as necessary.

Twin-vertical hydraulic cylinders mounted on a swivel plate enable the drilling head to be raised or lowered to the desired level, the swivel plate and a hand gear permitting holes to be oriented at any angle of a full circle, either horizontal or vertical or at any intermediate angle. The head is locked in position by a simple band block. Power is provided through a drive shaft and gearing from a 50-hp. electric motor. The power plant, vertical frame, hydraulic cylinders and drilling head are all mounted on a substantial truck body equipped with crawler tractors, each with independent control. Thus the 5½-ton machine is self-propelling and can handle itself over hard, soft or uneven ground.

In shale or other soft rock, as at the Enos mine, spiral rods are used on which a screw conveyor is welded. The rods, ordinarily 10 ft. long, have a square-pin joint at each end. Bits can be attached to any rod length with the same type of square-pin joint. A three-wing high-center bit, faced with borium, a tungsten-carbide alloy, drills the rock without the use of water.

Thrust is opposed by an adjustable pipe jack, but, where room is not available, a chain or cable can be attached to the front end of the hydraulic and the machine secured to an anchor pin set in the face of the bench or bank. Runs of as much as 600 ft. per day have been made. It is stated that, under favorable conditions, holes could be drilled to a length of 200 ft., but 45 ft. is about the length of hole which the methods at the largest of strip pits require. The bits furnished the drill may run from 2- to 6-in. diameter, according to need, but usually a 6-in. hole is preferred. At Enos, there are three Stripborers. Two are in daily use, and the third is kept as a spare.

Fig. 4—Typical Cross-Section of Cover.



Drilling Records at Enos Mine

Year	Total Holes Drilled	Total Feet Drilled	Hours Drills Worked	Av-Depth of Holes Ft.	Feet Drilled per Hour	Material Dislodged Total (Cu.Yds.)	Per Drilling Hr.	Cartridges of Liquid Oxygen	Cubic Yards per Cartridge
1930 (vertical drilling).......	13,256	413,803	29,915	31.22	13.83	5,331,367	178	128,348	41.54
1931 (vertical drilling).......	12,091	372,529	26,105	30.81	14.27	4,967,052	190	111,524	44.54
1930 and 1931 (vertical drilling)	25,347	786,332	56,020	31.02	14.04	10,298,419	184	239,872	42.93
1932 (seven months to Oct. 31, horizontal drilling)*........	1,886	91,226	1,960.5	48.37	46.53	....	...	......	100.00

* Change from vertical to horizontal drilling made in March, 1932.

SKILLFUL PLANNING

+ Opens Way to More Profits

In Anthracite Operation—II

By JAMES H. PIERCE
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IN the first installment of this outline of profit possibilities through skillful planning, published in the preceding issue (*Coal Age*, Vol. 38, p. 38), consideration was given to: (1) Organization Structure and Policies, (2) Methods of Recording and Interpreting Results, and (3) Detailed Face Studies. Next in order comes a consideration of Inside and Outside Company Costs, and the Integration of the Individual Mine With the Anthracite Industry.

IV. INSIDE COMPANY COSTS—Every company man and every official must justify himself to the degree in which he renders service to the face worker. Consequently, detailed force account studies must be made to determine the minimum number of company workers required for each district; also for general mine purposes, transportation, pumping, repairs, etc. These studies should develop the standard company force required to service each sectional foreman, who should not deviate from this standard without authority. Overtime records of the company force should be kept and should remain roughly within the limits of 5 per cent. Overtime may be reduced freqeuntly by rearranging the starting time of certain employees. Foremen should be instructed as to what constitutes reasonable performance for a day's work, such as the number of bonds to be installed per day, the quantity of trolley wire, and track work, unloading rock cars, setting props, cars handled per day per mule and per motor.

This study invariably indicates an excess number of company men who can be eliminated without any capital expenditure by simply rearranging, standardizing and simplifying work, and by securing additional efficiency through closer supervision. It will indicate, also, what men may be released for more effective work by changing methods of procedure, and it is well to set these up in six categories:

1. Those who can be eliminated without capital expenditures.
2. Elimination of men which can be justified by capital expenditures returnable in one year.
3. The same for two years.
4. The same for three years.
5. The same for five years.
6. The same for over five years and less than ten.

By thus scheduling capital expenditures, the greatest returns are quickly obtained, and by showing the rate of amortization, a capital expenditure may be seen to be justified or not when compared to the life of a given district.

A few illustrations of the economies which can be effected in company labor may be cited: Elimination of four pumpmen, saving $5,900 per year; elimination of ten mules and five men by the installation of room hoists, saving $10,000 per year; rearrangement of transportation, eliminating eleven men at a saving of $15,800 per year; installation of car haul costing $2,000 eliminated eight men and two mules at a saving of $11,880 per year; consolidating transportation from two veins into one by means of a plane at a cost of $3,000 effected a saving of $5,600 per year. These are a few of the hundreds of opportunities for saving which exist in any large mine. Taken in the aggregate, the savings developed by such an analysis will reach a staggering sum each year.

Having determined the capabilities of the equipment and the number of company men required, it then becomes necessary to balance men and equipment into a coordinated unit producing the most efficient results. When production and development schedules have been forecast, when delays have been eliminated, when standard labor force has been set up and unnecessary men eliminated, when service to the miner is properly functioning and equipment is balanced to the needs of production, then the problem resolves itself into one of maintaining this balance. The important thing to remember is that mines are not static but are ever changing, so that follow-up work is ever necessary to maintain this balance. The mine which functions well one year may perform badly in a succeeding year, and this is all symptomatic of poor planning or lack of continuous intensive supervision.

It is a pleasure to supervise a mine which functions properly. Labor reacts favorably to good management, as employees know more about the capability of their foremen than foremen know about their men. Mining can be made a fairly exact science if properly planned. Officials and workmen, when well trained and properly informed of the aims of higher management, become enthusiastic and proud of their performance. Thus a spirit of competition can be fostered and all will enter into the spirit of the game, which then ceases to be drudgery and becomes a live, vital and intriguing problem. Labor and under-officials become expressive and a new source of information and advice is opened up to the higher management.

Outside Company Force—A detailed study of the outside labor force and methods of operation generally indicates many possibilities for cost reduction. These can be mentioned only briefly, as each mine has its own characteristics and no general method of procedure can be laid down, except to point out where the opportunities exist:

1. At most mines, the incoming supplies are handled too frequently before they arrive at final destination. This is not only true of the heavier parts but also of the general run-of-mine supplies which must be replenished monthly.
2. At most mines, there is a great range of sizes for wires, rails, pipes,

fittings and timber, without any apparent necessity for carrying so many sizes in stock, except that they are required by reason of the fact that little attention was paid to these matters as the mine was developing. The result is that most inventories are too high. By proper attention to these matters, the inventory can be maintained at not over twice the monthly turnover.

3. A careful study should be made of production delays, as these delays will generally reflect all the way back to the working face.

4. The consolidation of breaker refuse and mine-car disposal at a common point frequently presents labor-saving possibilities.

5. A careful check on the roll and screen practice and a calculation of the effect of these practices on the sales price of the coal.

6. The elimination of coal breakage in dumps, pockets and breakers, as each percentage of breakage affects the average realized price about 5c. per net ton.

7. Automatic starting and stopping of isolated electrically driven equipment.

8. By a careful study of shop practice, in certain cases, maintenance of pumps, shaking conveyors and electrical equipment has been reduced 60 per cent, due to a change in shop methods.

9. The elimination of labor by consolidation of duties may frequently be effected by providing better facilities for the workmen to perform their work. In certain instances, men have been eliminated entirely through pushbuttons. In another case, the building of a few walkways and stairways in a breaker made the work sufficiently convenient that four jig runners were dispensed with at a saving of $18.50 per day.

10. The elimination of wasteful practices with respect to supplies, particularly timber.

11. A careful check of insurance rates to determine if proper valuations on buildings and equipment are being carried, and to eliminate excess valuations.

To give an indication of the possibilities developed by such studies, the following items of saving are listed at random and pertain to several investigations of the outside costs of certain antracite collieries:

COLLIERY NO. 1

	Savings per Year	Capital Investment
Elimination of hoisting unit	$12,300.00	......
Inventory reduction	627.00	......
Wastage at sawmills	638.00	......
Mechanizing shaft head	5,000.00	$2,500
Breaker force reduction	5,200.00	600
Outside force reduction	12,681.00	......
Insurance	612.00	......
Total	$37,058.00	$3,100

COLLIERY NO. 2

	Savings per Year	Capital Investment
Insurance	$885.41	......
Consolidation of jobs	3,286.00	$600
Handling supplies	711.00	......
Refuse disposal	2,540.00	......
Inventory reduction	1,388.00	......
Saving in supplies	31,100.00	......
Transportation	5,000.00	3,000
Overtime reduction	14,674.80	......
Total	$59,585.21	$3,600

These are typical collieries having labor costs lower than the average labor cost of the anthracite field.

Practically all collieries have wasteful practices, and the investigator must approach his study with an open mind and without set formulas, so that he may not fall into the same line of thought as the operating personnel, as real economies can be developed only by bringing to the study a fresh viewpoint.

Earlier in this article, it was stated that men take great pride in doing jobs well, and undoubtedly would not knowingly permit such opportunities for saving to escape them; the real answer lies in the fact that they are not thoroughly cost-conscious, nor are they experienced in analyzing, comparing and interpreting their problems and then adjusting conditions to correct wrong practices.

Power—Electric power, when purchased, usually is paid for according to maximum demand and quantity consumed, and in some cases, at least, can be purchased at a lesser cost for certain periods of the day than at others, depending upon the peak load at the main power plant.

It is advisable, then, to utilize power at periods when lower costs can be obtained. The heavy load occurs during the day shift, and for this reason it is very important to utilize power for pumping during the latter 16 hours of the 24-hour period. Night pumping can often be arranged by establishing large sumps or auxiliary sumps to impound the water during the day period, allowing it to flow to the main sump or pumping plant during the night period.

Often it is found that improper application of motors is made, which is not only wasteful in power consumption but does not best suit the operation. Many devices are available for curtailing the use and cost of power, such as load limiters, the use of capacitors and synchronous motors for correcting power factor, which are so well known as to require no comment. In general, power rates per kilowatt-hour are too high, and coal executives in great numbers are now considering manufacturing their own power requirements, particularly at bituminous mines.

Not infrequently the power distribution system is a gradual growth without definite plan, and is not only wasteful but may result in serious delays in operation.

V. Relating the Mine or Company to the Coal Industry—After a careful, comprehensive survey has been made of a mine or group of mines in the manner outlined in preceding paragraphs, one man can tell very definitely within reasonable limits what to expect in the way of operating results. This, however, may not be sufficient, particularly if the industry as a whole has a declining volume such as we are witnessing in anthracite sales. It then becomes necessary to determine what are the prospects for a given company to survive, and this depends upon its ability to adjust itself to meet changing conditions.

One can, with reasonable accuracy, forecast operating costs into the future on the assumption of a given wage scale, but no one can accurately forecast sales realization and volume, as this is adversely affected by external competition of rival fuels, by economic conditions, and by changes in the buying habits of the population. Sales volume and sales price, however, will be the determining factors in the success of mining companies, and if these cannot be forecast, we must find some other yardstick for determining the relative chances of a given company within the industry.

This can be determined only by adhering to the general principle that "such companies will survive whose costs and sales realization are kept balanced with the weighted average cost and sales realization of that volume of tonnage which the market will absorb." Therefore, by knowing the relative production costs and sales policies of various companies, one may gage their possibilities for the future.

Our study of a mine, therefore, really begins and ends with the cost sheet, and the projection of a sound plan into the future is for the purpose of insuring that the relative position of the mining company with respect to the industry may constantly improve.

Where the physical condition of a mine defeats the best efforts of the management to stay in this select class, one at least has the assurance that sound management and careful preplanning will apprise one in ample time of the approach of the mine's economic life, and thus prepare the way for liquidating under the best possible circumstances.

As the success of individual mines, therefore, is closely linked to the success of the industry, there is a general need for more cooperation among the producing units of the industry. With the small number of anthracite producing units, it should be fairly simple to work out a cooperative plan, but this has not been the case, for reasons which are generally known.

It is highly probable that before long we shall see a reasonable interpretation placed upon the intent of the Sherman law, and then constructive plans may be evolved for the entire industry. These plans will not comprehend price control except as prices become stabilized through controlled production.

It is our opinion that for some years the industry will have a capacity of from 15,000,000 to 20,000,000 tons in excess of consumer demand unless some means can be found of recapturing lost

(*Turn to page 91*)

DEDUSTING COAL—II

+ Offers Advantages In Both Cleaning and Marketing

By KENELM C. APPLEYARD

Managing Director,
The Birtley Co., Ltd.
Birtley, England

AT FIRST GLANCE, it would not appear to be difficult to remove dust from coal; as a matter of fact, however, there are a number of problems to be solved. Not the least of these is the concentration and de-aeration of the dust after it has been removed from a coal stream. The major problems involved are:

1. To effectively remove the maximum percentage of dust below a definite particle size without removal of more than a minimum above that size.
2. To perform the operation under varying conditions of moisture and tonnage in the raw feed with the necessity of creating an apparatus that will not choke even if wet coal is fed to it.
3. To avoid degradation, particularly after dedusting is complete in the apparatus.
4. To provide easy methods of regulation so that permanent or semi-permanent alterations in the characteristics of the raw coal can be met.
5. To eliminate, as far as possible, abrasion by dust, which is likely to be very severe on moving parts where dust volumes are large.
6. To remove the dust completely from the air used in the process and to concentrate it ready for disposal.
7. To provide the possibility of differential classification of the dust.
8. To carry out the process with the minimum expenditure of power and supervision.

Screening undoubtedly is the best method for removing fines, since by that method an actual mechanical separation, based on particle size, is made. It is rare, however, to find coals which will screen satisfactorily at sizes below $\frac{1}{16}$-in., and even more rare when circumstances justify the elaborate and expensive installation necessary to screen out that size from any considerable tonnages. Where the particle size to be removed is 1/50-in. or 1/60-in., as is the case in connection with coal-washing problems, screens are almost out of the question.

All other types of dedusting equipment use air as the dust-removing medium. These include: (*a*) louver, or Venetian-blind, type apparatus, with open, closed or partly closed circuit; (*b*) screen *cum* air type, with closed or partly closed circuit; (*c*) central distributor type, with moving or stationary distributor; (*d*) vertical tube type, with closed circuit; (*e*) vertical tube type, with jet feed, expansion chambers and open circuit. These types may be further classified into two main groups: viz., the closed-circuit system, where the air used for removing the dust is circulated continuously through the system, and the open-type apparatus. All the earlier systems and most of the present ones belong to the closed-circuit group.

Fig. 1 shows the distribution of the various sizes of a raw coal in the dust and in the dedusted product after treatment in a vertical tube Birtley aspirator. A similar curve from a paper presented by the author before the A.I.M.E. in 1930 (Tech. Pub. No. 374, "Dry Cleaning of Coal in England") is reproduced in Fig. 2 to indicate the gradual increase in efficiency during recent years. Both curves refer to the same coal, which is not only damp but has other characteristics which render it a somewhat difficult subject for efficient aspiration.

Results from the operation of a closed-circuit apparatus at the Tinsley Park colliery (Riley, *Transactions of the Coke Oven Managers' Association,* 1932) are set out in Table I. This in-

Fig. 1—Distribution of Various Sizes of Raw Coal in the Dust and in Dedusted Coal After Dedusting.

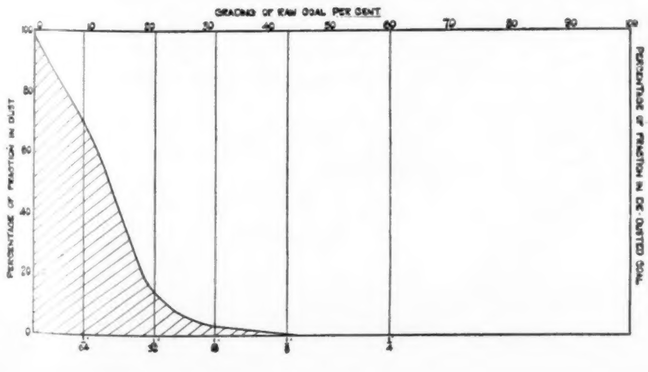


Fig. 2—Distribution Curve for Same Coal in Earlier Stages of Application of Dedusting Process.

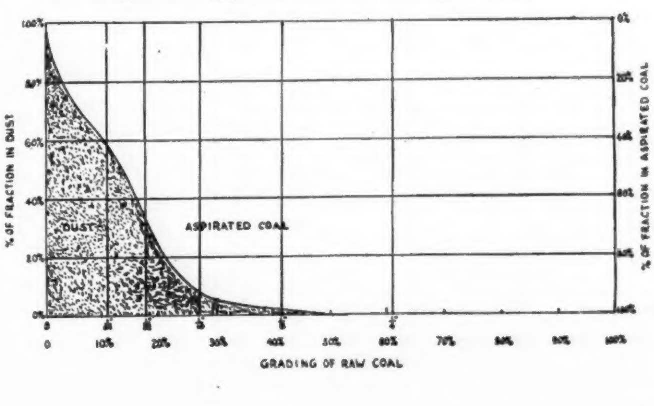


Table I—Dedusting at Tinsley Park Plant

Size, In.	Raw Coal, Per Cent	Dedusted Coal, Per Cent	Dust, Per Cent
3/8 -1/20	72	81.5	.....
1/20 -1/40	11	10.5	.....
1/40 -1/60	4	4.5	3.5
1/60 -1/80	3	1.5	7.5
1/80 -1/100	2	1.0	12.5
1/100- 0	8	1.0	75.5
Bulk Coal	100.0	100.0	100.0

Table II—Dedusting at Partington Plant

Size, In.	Raw Coal, Per Cent	Dedusted Coal, Per Cent	Size, In.	Mixed Dust, Per Cent
+1/8	68.8	72.81	+1/8	0.25
+1/16	11.0	14.65	+1/16	2.00
+1/64	11.4	10.99	+1/32	7.25
—1/64	8.8	1.55	+1/64	14.25
		Through a 60 I.M.M. Screen = 0.52	—1/64	76.25

Table III—Grading of Filter Dust

	Per Cent
+ 48 mesh (0.0116 in.)	0.8
48 — 65 mesh (0.0082 in.)	3.6
65 — 100 mesh (0.0058 in.)	9.7
100 — 150 mesh (0.0041 in.)	11.6
150 — 200 mesh (0.0029 in.)	15.9
— 200 mesh	58.4

Table IV—Dedusting Results on Feed to Pneumatic Separator

Size, In.	Raw Coal, Per Cent	Dedusted Coal, Per Cent	Dust, Per Cent
+ 1/8	1.5	2.0	....
1/8 — 1/16	31.5	41.0	2.5
1/16 — 1/32	29.0	35.0	9.5
1/32 — 1/64	16.0	15.0	17.5
— 1/64	22.0	7.0	70.5

stallation was designed to form an integral part of a process in which the presence of slurry would be fatal; because of this, the compactness and simplicity of design and the low capital cost usually associated with closed-circuit installations were sacrificed to obtain as high an efficiency as possible. The apparatus was designed by Dr. R. Lessing in conjunction with his process for cleaning coal by flotation in calcium chloride. The capacity of the plant is given at 30 tons per hour. From the data in Table I, it would appear that dedusting at 1/100-in. is the goal.

Since the closed-circuit type of apparatus was first introduced in its simplest form some years ago, there have been a number of modifications in design for the purpose of increasing efficiency. In one of the more recent developments of the closed-circuit type of apparatus the raw coal to be dedusted is fed onto a jigging screen which traverses it across a sealed-air circuit in which a fan blows the dust up from the bed of coal into a settling chamber, whence the air returns to the fan for recirculation. The main claim made for this apparatus is that it permits dedusting of comparatively large coal without excessive breakage. Because this equipment has only recently been put on the market, no performance data have as yet been published.

In the Birtley open-circuit apparatus (Fig. 3), actual separation of the dust from the coal is carried on in a vertical tube, *A*. Coal is fed down chute *B* against an adjustable door, *C*, and rests on the adjustable plate *D*. The aspirator comes into operation automatically as soon as the main fan is started up, as the reduction in pressure inside the aspirator is sufficient to draw in air through the primary air port *E*. Two secondary air ports, *F-F*, one on each side of the tube, are provided to adjust the upward velocity of the air in the tube *A* and to permit variation in the size of dust removed. The dust leaving the tube passes into an expansion chamber, *G*, equipped with baffles, where the bulk of the dust is settled and discharged through automatic sealing valves, *J*. The feed being automatic, coal ceases to flow into the dedusting tube *A* as soon as the suction fan is stopped.

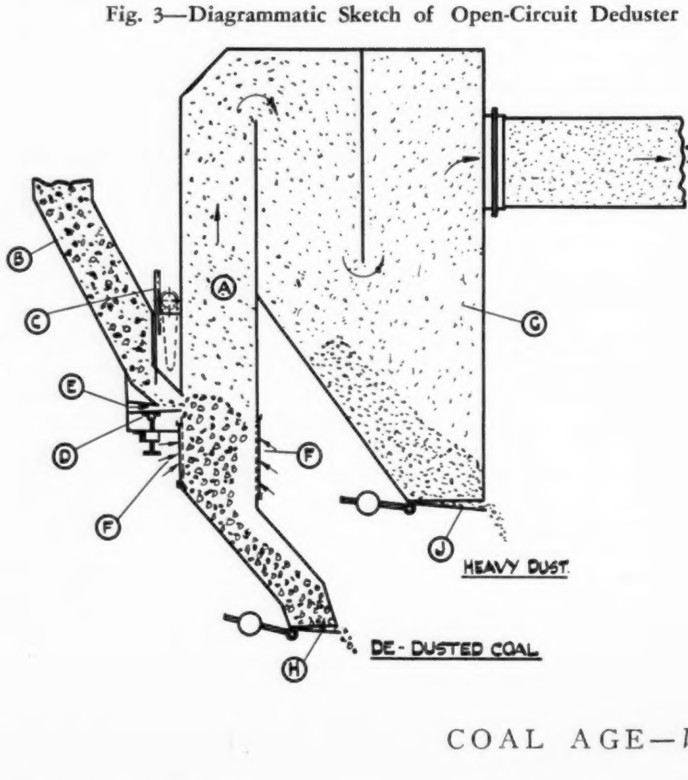
The largest installation of this type put in service up to date was incorporated in the design of a new washery to treat 175 tons of coal per hour at the Partington works of the Lancashire Steel Corporation. This plant, illustrated in the preceding issue of *Coal Age* (p. 55), includes four 4-ft. dedusting tubes and a Birtley-Waring filter. As a result of the inclusion of the dedusting plant in the washery scheme, the water in circulation is maintained well below 5 per cent of solids. No slurry is run to waste, and no water, except that required as make-up, is used. The collected dust, together with the small quantity of slurry recovered from the settling cone, is mixed with the washed and crushed coking coals, and the moisture content of the mixture sent to the ovens is maintained below 8 per cent.

If dedusting were not used in this case, it is doubtful whether the moisture content of the coal charged to the ovens could be maintained below 12 to 13 per cent. The ash in the washed coal would be higher, and both moisture and ash would increase toward the end of the week as the slurry accumulated in the wash water, which probably would contain 13 per cent of solids and which would have to be run off periodically. Data given in Table II are typical of the operation of this plant during the acceptance test, when the free moisture varied from 2 to 3 per cent.

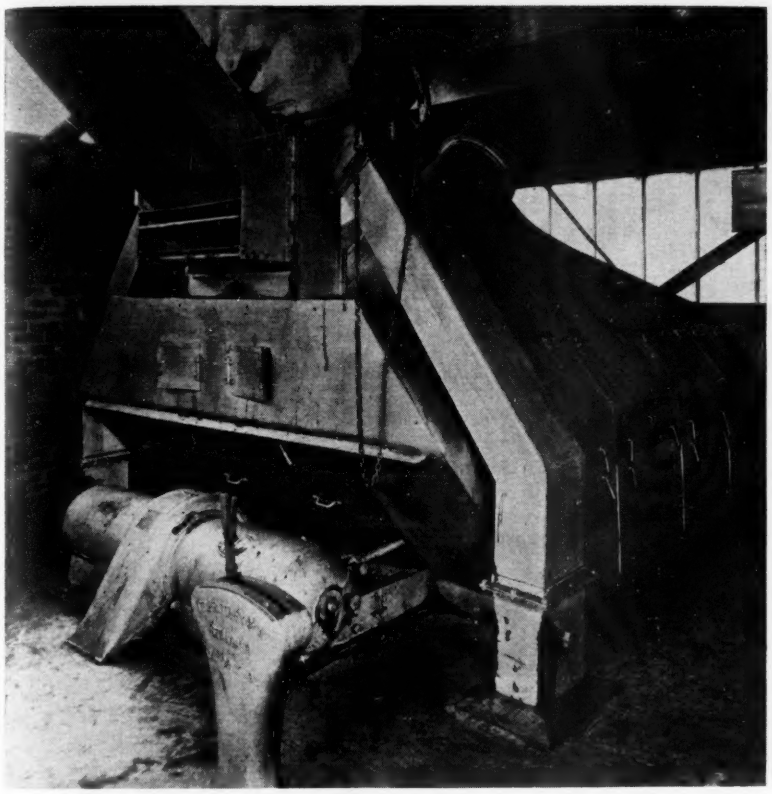
The question of wear and tear on fabric filter tubes and fans is often raised, but it must be borne in mind that, in an arrangement of this kind, the whole of the coarse dust already has been removed by the settling chamber and the cyclone, and only the finest and least abrasive particles come in contact with the filter fabric and no dust passes through the fans. Table III indicates the grading of a sample of dust taken from a filter.

Perhaps the most desirable feature of any dedusting process is that it should be capable of continuous and efficient operation under varying conditions. Especially where the washed coal is to be used for coking, intermittent dedusting probably is worse than no dedusting at all. The grading of raw coal, dedusted coal and the dust from an aspirator dedusting the feed to a pneumatic separator treating coal below 1/8-in. is shown in Table IV.

Fig. 3—Diagrammatic Sketch of Open-Circuit Deduster



Among the systems recently introduced in the United States are the Blaw-Knox deduster (*Coal Age*, Vol. 37, p. 422), the Norton-Collins dust-extraction system (*Coal Age*, Vol. 38, p. 73) and the Simon-Carves system described on p. 107 of this issue. The system installed at the New Orient mine of the Chicago, Wilmington & Franklin Coal Co. by Allen & Garcia Co. was described briefly last summer (*Coal Age*, Vol. 37, p. 271). Other recent material on dedusting is incorporated in the reports of the joint meeting of the Coal Division and the Anthracite Section of the A.I.M.E. (*Coal Age*, Vol. 37, p. 398) and of the winter meeting of the Illinois Mining Institute (*Coal Age*, Vol. 37, p. 440).—THE EDITORS.



Open-Circuit Type Aspirator Dedusting Feed to Pneumatic Separator (See Table IV)

It is perhaps as well, and need not be a matter for criticism, that an article of this type should be written by an enthusiast. Rarely does an enthusiast have his hopes of attracting interest or avoiding some form of condemnation fulfilled. It has been an interesting experience and a satisfactory reward for some years of investigation, failures and successes to find almost universal agreement on the merits of dedusting coal among those who have given serious thought to the subject in England and in America. While opinions may differ as to the best method of carrying out the operation, the inherent advantages are difficult to deny, and a steady development both in the theory and the practice of the process can be looked forward to with certainty.

▼

Skillful Planning for More Profitable Anthracite Operation—II

(Concluded from page 88)

markets through a drastic reduction in retail price and in finding new uses for anthracite coal. The anthracite industry is losing approximately 300,000 tons of prepared coal monthly to competitive fuels, due to high prices and automatic heat.

We must, therefore, have additional research to find other uses for anthracite and to develop machines to burn it automatically in the individual home if we are to compete successfully with oil, gas, coke, electricity and soft coal. This phase has been woefully neglected, although the Anthracite Institute has made a valiant effort with the funds available. The industry can afford to spend from $5,000,000 to $10,000,000 per year to find the solution of this problem, as it is now in the same position as the gas companies were when electric lighting first came into use.

Although lower unit production costs and improved standards of preparation will relieve the immediate difficulties of many anthracite producers, the ultimate fate of the industry and of many producers within the industry depends upon the ability to market a sufficient quantity of coal so that the mines may be operated on a reasonably efficient working-time basis. Anthracite is the best fuel in the world, but the American people have learned that it is not essential to their welfare; consequently, competitive fuels are rapidly replacing it because they are being merchandised with more modern methods. The industry must adopt a constructive program which comprehends fewer wholesalers and retailers, and must give to the various grades of coal shipped some distinctive trademark to identify each, as an assurance against a lessening of the quality.

Producers must gain control of the retail situation by establishing in various districts representative retailers to merchandise their product and by refusing to sell to those who are improperly financed and organized to contact and service the consumer properly. It must be made difficult and expensive for new dealers to enter a given territory. By reducing the number of retailers, the sales volume and earnings of the remaining retailers will increase and their credit improve, thus, in turn, strengthening the wholesalers. It should be possible to retail coal on a properly organized basis for probably $1.50 per ton less than present retail margins.

The industry must not only effect this saving but it must likewise secure reduction in freight rates and other distribution costs, and sufficient reduction in mining costs to enable coal to be sold in the metropolitan areas for $8.50 or $9 per ton, at which figure, we believe, the anthracite industry will again recoup its tonnage volume and profits.

The leaders of the industry can work out the details of such a program if they have the will to do so. The time has now arrived when they must collectively collaborate in the formulation of a broad, constructive merchandising policy, or resign themselves to inevitable liquidation. They must unitedly press for the revision of the Sherman law, so as to be free to work out constructive policies toward production control.

A curtailment of 15,000,000 tons annually of productive capacity would practically result in stabilization. The cost to accomplish this would not exceed $50,000,000. Amortizing and interest charges on this amount on a 6 per cent, ten-year basis, would be $6,650,000 annually, which, spread over a stabilized output of 50,000,000 tons annually, would amount to approximately 13c. per ton.

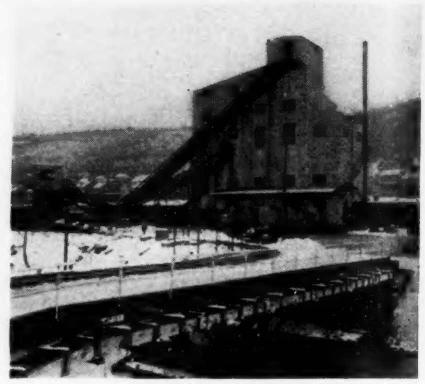
Internal competition, resulting in price cutting, heavy advertising, consumer service, cash discounts, prepaid freight, changed preparation standards, and many other forms of ruthless competition, are costing the industry at least $1 per ton more than this orderly and equitable solution.

The anthracite industry, to merit banking support, must earn fifty million dollars more annually, and this can be attained only by an enlightened procedure with respect to sales and distribution costs, with labor carrying its share of the burden toward reducing production costs to the minimum.

FADING EGG MARKET

+ Anticipated in Designing

Salem Hill Breaker



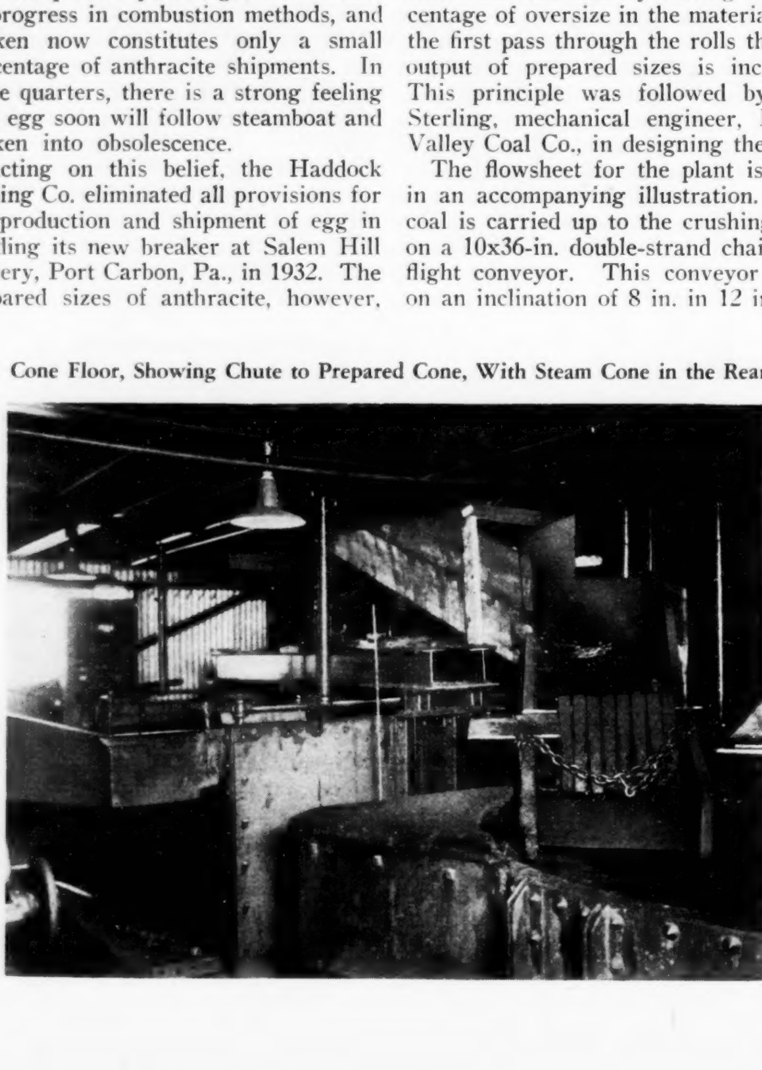
Salem Hill Breaker

PROGRESS in firing technique and in the design of coal-burning equipment has brought the question of the future of the larger anthracite sizes sharply to the fore. The smaller sizes offer definite promise of reductions in fuel cost when burned in modern equipment, and this trend has been accentuated by the rise of the stoker. Lump and steamboat vanished from the anthracite picture years ago, the victims of progress in combustion methods, and broken now constitutes only a small percentage of anthracite shipments. In some quarters, there is a strong feeling that egg soon will follow steamboat and broken into obsolescence.

Acting on this belief, the Haddock Mining Co. eliminated all provisions for the production and shipment of egg in building its new breaker at Salem Hill colliery, Port Carbon, Pa., in 1932. The prepared sizes of anthracite, however, still command the best prices and bring in by far the major part of the average realization. For this reason, every effort was made in the design of the Salem Hill plant to insure the maximum yield of stove, chestnut and pea, thus compensating for the loss in egg realization. Accomplishment of this objective was based on numerous tests and several years of experience in roll practice, which showed that by raising the percentage of oversize in the material from the first pass through the rolls the total output of prepared sizes is increased. This principle was followed by Paul Sterling, mechanical engineer, Lehigh Valley Coal Co., in designing the plant.

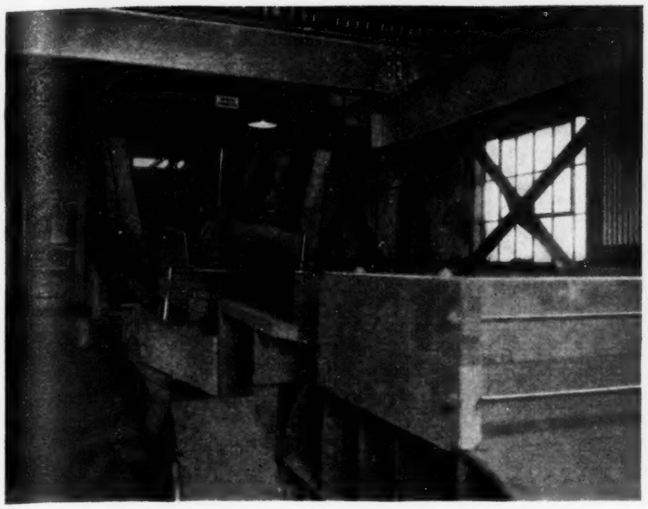
The flowsheet for the plant is given in an accompanying illustration. Raw coal is carried up to the crushing head on a 10x36-in. double-strand chain-and-flight conveyor. This conveyor is set on an inclination of 8 in. in 12 in., and thus acts to smooth out the rate of feed to the plant. Because of the steep pitch, any excess coal falls out of the flights and rolls back until it can find room on a flight that is not carrying a maximum load. Thus the conveyor cannot be overloaded, and the rate of feed, as a result, is uniform.

Cone Floor, Showing Chute to Prepared Cone, With Steam Cone in the Rear

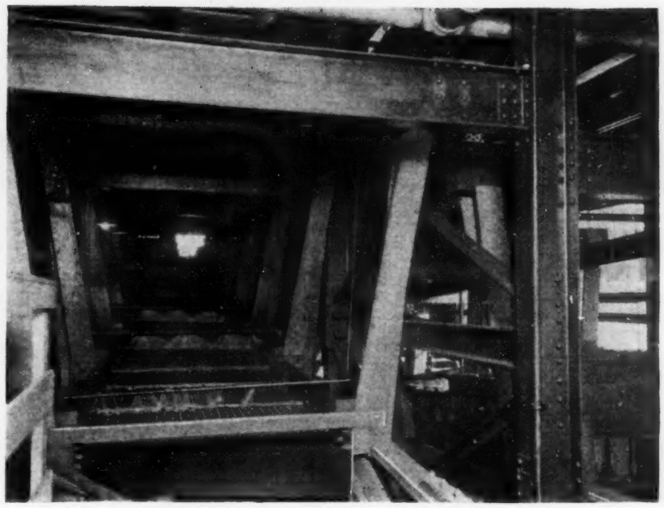


The chain-and-flight conveyor discharges onto the bull shakers, where the raw coal is separated into three sizes: plus $4\frac{1}{2}$ in., $4\frac{1}{2}$x$2\frac{7}{16}$ in., and minus $2\frac{7}{16}$ in. The plus $4\frac{1}{2}$-in. coal (lump and steamboat) goes to the shaking picking table, and from there, minus the rock, to the No. 1 rolls, where it is crushed to broken and smaller, with approximately 20 per cent of steamboat remaining. The $4\frac{1}{2}$x$2\frac{7}{16}$-in. coal (broken and egg) goes from the bull shakers to the No. 3 rolls, where it is broken down to stove and smaller, with approximately 20 per cent egg. The product of both rolls is discharged onto the main raw-coal conveyor and is again passed over the bull shakers, where stove and smaller is taken out, leaving the oversize to make another trip through the rolls. Separate screens were not installed under the rolls because the relatively small output of the plant (500 gross tons in eight hours) made it feasible to design the bull shakers with sufficient capacity to take care of all the necessary preliminary separation.

By recirculating 20 per cent of the product from each of the rolls, it is expected that the production of prepared sizes will be 88 to 89 per cent,



Picking Floor, Showing Bull Shakers, Picking Table and No. 1 Rolls



Desanding and Sizing Shakers; Steam Shakers Are at the Right

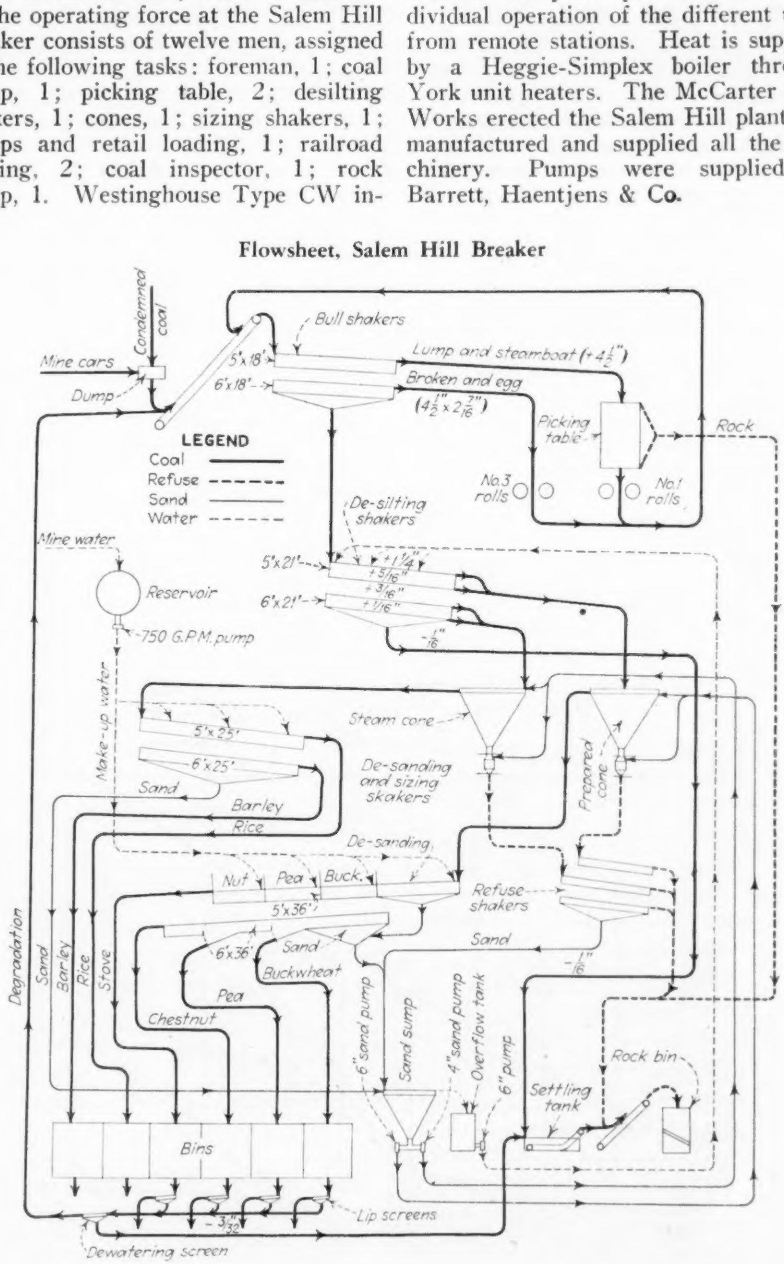
an increase of 5 to 7 per cent over what could be expected from ordinary roll practice. The rolls, 34x36-in., are equipped with steel sole plates and built-up drums with manganese steel segments, and are protected by outside breaking plates.

Minus $2\frac{7}{16}$-in. raw coal from the bull shakers goes to the desilting shakers, consisting of two double-deck screens equipped with punched plates having the following openings: $1\frac{1}{4}$ in., $\frac{7}{16}$ in., $\frac{3}{16}$ in., and $\frac{1}{16}$ in. Everything above $\frac{3}{16}$ in. (stove, chestnut, pea and buckwheat) goes to an 8-ft. Chance sand-flotation cone for cleaning, while the $\frac{3}{16}$x$\frac{1}{16}$-in. coal (rice and barley) is cleaned in an 8-ft. rectangular-top cone. Both cones were mounted side by side on the same floor to minimize labor and facilitate supervision. The minus $\frac{1}{16}$-in. silt is discharged into a settling tank, from which it proceeds over a dewatering conveyor to the refuse conveyor. Washed coal from each of the cones is desanded and sized on shaker screens, and discharged into pockets arranged for loading either railroad cars or trucks (retail coal). Refuse from both cones is desanded on a separate bank of refuse shakers, from which the sand goes to the 15-ft. sand sump and the refuse to the rock conveyor. All shakers are built with 4x6-in. oak sides and steel cross angles, and are equipped with punched plates, wood hanger arms, flexible wood driving arms, and cast-iron eccentrics with a 6-in. stroke. Operating speed is 155 r.p.m., and the inclination is $\frac{3}{4}$ in. in 12 in.—the anthracite standard.

Each cone is equipped with its own sand pump, 6 in. for the prepared cone and 4 in. for the steam cone. Overflow from the sand sump is discharged into a separate tank, from which it is pumped to the desilting shakers by a 6-in. pump. Fresh water for make-up is pumped from a 200,000-gal. reservoir to the sizing shakers by a 750-g.p.m. pump. The reservoir is replenished by water from the mine, which is alkaline.

The operating force at the Salem Hill breaker consists of twelve men, assigned to the following tasks: foreman, 1; coal dump, 1; picking table, 2; desilting shakers, 1; cones, 1; sizing shakers, 1; pumps and retail loading, 1; railroad loading, 2; coal inspector, 1; rock dump, 1. Westinghouse Type CW induction motors are used throughout. The control system provides for the individual operation of the different units from remote stations. Heat is supplied by a Heggie-Simplex boiler through York unit heaters. The McCarter Iron Works erected the Salem Hill plant and manufactured and supplied all the machinery. Pumps were supplied by Barrett, Haentjens & Co.

Flowsheet, Salem Hill Breaker



MINING ENGINEERS

+ Discuss Economic and Technical Problems

At Annual Midwinter Meeting

DISCUSSION of economic questions vied with consideration of technical problems in the sessions of special interest to the coal industry at the 142d meeting of the American Institute of Mining and Metallurgical Engineers, held at the Engineering Societies Building, New York City, Feb. 20-23. Major topics on the economic side of the program for the annual midwinter gathering included a detailed analysis of mine mortality; progress reports on coal classification labors, with particular emphasis on use classification; and forecasts on the relative growth of coal and oil consumption during the next seventeen years. On the engineering side of the program, consideration was given to subsidence, roof control, preparation, safety, transportation, and the occurrence and flow of gas in the Pocahontas No. 4 bed.

Cost is the largest single factor controlling the selection of coal by stationary steam plants, declared Thomas W. Harris, Jr., chairman of the subcommittee of the technical committee on use classification, at the opening session of the Coal Division on Feb. 20. In only one major consuming area, the Pittsburgh district, is cost put second. The rating of the other major factors in selection, as developed by a questionnaire survey covering several hundred plants made by the committee, is shown in Table I.

Because transportation charges are such an important part of the delivered price of coal, these plants generally draw their fuel from the nearest mining fields. Five out of seven of the consuming areas reported over 90 per cent of their coal so secured; a sixth area, 87 per cent; and the seventh, 83 per cent. Size, in which price also is a controlling factor, ranks second in fuel selection. As shown in Table II, outside of the Middle Atlantic states, which rely largely on medium- and low-volatile coals of Maryland, Pennsylvania and West Virginia, 90 per cent of the tonnage used was slack or screenings.

In general, the committee found, coal selection is not closely related to combustion equipment types, except possibly in the Middle West, where the predominance of chain-grate stokers reflects the tendency to adapt equipment to the nearest coal. Consumption by types of equipment is set forth in Table III. Maintenance ranked second in the major factors entering into fuel selection. The relative importance of each factor in selection, "expressed in terms of percentage of the whole number of plants mentioning that item among the four most important factors," is shown in Table IV. A breakdown of the four leading factors by types of combustion equipment is summarized in Table V. The close relationship between clinkering and the ash-fusion point is revealed in a comparison of clinkering ratings in Table V with the data on fusing temperatures in Table VI.

H. T. Coates suggested that mines should be rated according to the free-burning, anti-clinkering, anti-slagging, smokelessness, grindability and friability of the coal produced. Any such rating scheme, said J. B. Morrow, preparation manager, Pittsburgh Coal Co., must distinguish between sizes. In view of the general preference for slack, western Pennsylvania producers may find it necessary to crush coarse coal when industrial demand really recovers. Since coarse and fine sizes may normally have widely varying characteristics, intermittent crushing might make it necessary to change mine ratings daily or weekly.

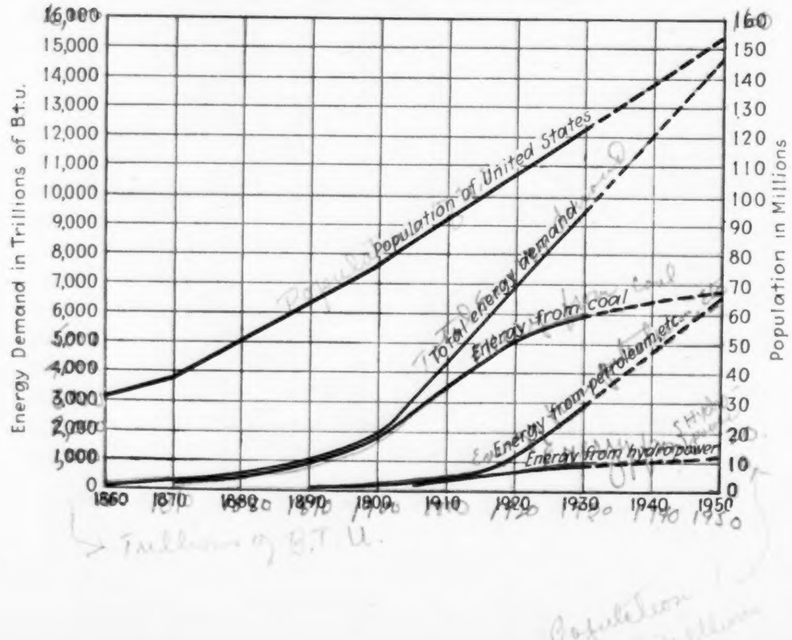
Sound thinking, careful planning and cooperation between operators, miners and retailers will go far toward solving the problems of anthracite, declared Alan C. Dodson, president, Weston Dodson & Co., in an address read in his absence by Caleb S. Kenney, vice-president in charge of sales, at the joint luncheon meeting of the Coal Division and the Anthracite Section, Feb. 20. All of anthracite's troubles cannot be

New Officers and Directors

Frederick M. Becket, vice-president, Union Carbide Co., New York City, has been elected president of the A.I.M.E., succeeding Scott Turner, director, U. S. Bureau of Mines. Hugh Park, manager, Nipissing Mining Co., Cobalt, Ont., and Frank L. Sizer, consulting engineer, San Francisco, Calif., have been made members of the board of directors of the Institute.

Eli T. Conner, consulting engineer, Scranton, Pa., heads the Coal Division, with Ray W. Arms, Roberts & Schaefer Co., Chicago, as vice-chairman. Donald Markle, president, Jeddo-Highland Coal Co., Jeddo, Pa.; F. G. Tryon, U. S. Bureau of Mines, Washington, D. C., and J. W. Wetter, vice-president and general manager, Madeira, Hill & Co., Philipsburg, Pa., have been elected executive committeemen of the Division.

Fig. 1—Hutchinson-Breitenstein Forecast for Coal, Petroleum, Hydro-Power and Total Energy Demand.



laid at the door of the depression, he asserted in offering eight suggestions for remedying internal and external difficulties. Dodson's program calls for:

1. Strong tax associations to insure equitable treatment for all interests and combat unfair state and federal legislation.

2. Fair assessments as a basis for setting valuations leading to a readjustment of high royalties.

3. Planned production, budgeting, study of mining methods and education of employees to reduce high mining costs.

4. Fostering of intelligent public appreciation of anthracite problems as a means of halting union insubordination and outlaw strikes, use of the anthracite union to fight bituminous battles, and to insure the eventual establishment of a fair wage agreement that will extend the present market.

5. Frank publicity of anthracite affairs and the establishment of accurate financial reports to eradicate public distrust of anthracite companies.

6. Creation of sentiment for freight-rate reductions through the adoption of a comprehensive program of self-help.

7. Strengthening of cooperative effort within the industry by the establishment of strong trade association policies.

8. Establishment of friendly relations with elected representatives as a means of combatting unfair state and national legislation.

Given an operating profit per ton, certain definite rates of interest and certain carrying charges, W. H. Craigue, valuation engineer, Washington, D. C., in a paper read by C. T. Durell, offered formulas from which to derive information as to the sums which should be expended to provide for the largest return from a property. Some have provided reserves altogether beyond possibility of profit; so much that the possession of some of the unmined coal is a liability rather than an asset. The valuations are based by Mr. Craigue on a single interest rate and also on the Hoskold method of valuation with two rates of interest, one a risk rate and the other a safe sinking-fund rate.

Demands for energy, irrespective of energy source, increase steadily at an exponential rate considerably greater than the rate of growth of population; between 1920 and 1930, for example, the exponential rate of growth of population was 1.5 per cent annually, whereas the rate in energy demand was 3.5 per cent between 1920 and 1925 and 3 per cent between 1925 and 1930. Such analysis of the growth factors, said W. Hutchinson, professor of mining, Massachusetts Institute of Technology, for himself and A. J. Breitenstein, assistant engineer, Philadelphia & Reading Coal & Iron Co., Ashland, Pa., indicate that at some time many years in the future, the demand for energy in the industrial areas will become satisfied, and from then the demand may increase only in proportion to the increase in population.

If, on the other hand, comparison is made of the exponential rates of the total annual energy derived from coal and petroleum, that from coal is found to be growing at a much slower rate than the population; whereas petroleum during the 5-year period 1925 to 1930 progressed at an exponential rate of 7 per cent. If we accept the estimates of petroleum reserves expected to be available at low cost for twenty years, the outlook for the coal industry is one of little or no growth, whereas petroleum is expected to double its market during the same period.

High prices for coal, said A. T. Shurick, consulting engineer, New York City, had opened the door to economy in the use of coal and to the use of substitute fuels. This economy and this use of substitutes had lost nearly all its force with the lowering of coal prices and might accordingly make much less progress in the years to come. It was unsafe to draw conclusions, therefore, on past curves of energy use and consumption.

Attempts to plot curves for future use of coal could not be intelligently made, said F. G. Tryon, Bureau of Mines, Washington, D. C., until some attempt had been made to evaluate separately the quantity of coal used for power, processing and heat, each with its own index of expansion and each with its own limiting conditions. One cannot tell, said A. H. Willett, National Coal Association, what will happen if prices of coal continue to fall. Already many plants equipped with expensive devices for saving fuel can no longer earn a profit on them.

The advantages of steel castings in mine-car construction were outlined by W. M. Sheehan, eastern division sales manager, General Steel Castings Corporation, at the Coal Division session Feb. 21. These benefits, growing out of homogeneity of the material, lack of restrictions on the size and shape of the castings, high tensile strength, flexibility in metal distribution and resistance to corrosion, have been proved in railroad practice over a number of years.

One major advantage of cast-steel car bottoms in the coal industry, he continued, is the possibility of increasing capacity while retaining or reducing the original weight. The Lehigh Navigation Coal Co. adopted the skeleton-type cast-steel under-

Table I—Geographical Location in Relation to Factors Affecting Coal Selection

	First		Second		Third		Fourth	
1. New England	Fuel cost	100	Clinker	69	Maintenance	62	Slagging	38
2. Mid-Atlantic	Fuel cost	88	Maintenance	71	Clinkering	67	Slagging	27
3. Pittsburgh	Clinkering	83	Fuel cost	65	Maintenance	57	Slagging	52
4. Central	Fuel cost	78	Clinkering	76	Maintenance	65	Slagging	43
5. Mid-West	Fuel cost	94	Maintenance	60	Clinkering	51	Labor	36
6. Lakes	Fuel cost	91	Maintenance	82	Clinkering	55	Overloads	36
7. South Atlantic	Fuel cost	75	Maintenance	75	Clinkering	50	Labor	50

Table II—Steam Plant Consumption by Sizes

Market Division	Slack or Screenings Tons	Per Cent	Run of Mine Tons	Per Cent	Stoker and Nut Tons	Per Cent	Total Tons
New England	526,000	95	28,000	5	......	..	554,000
Mid-Atlantic	827,000	23	2,606,000	74	104,000	3	3,537,000
Pittsburgh	2,277,000	65	916,000	26	335,000	9	3,528,000
Central	3,193,000	97	18,000	1	74,000	2	3,285,000
Mid-West	3,941,000	99	....	..	50,000	1	3,991,000
Upper Lakes	360,000	100	....	..	......	..	360,000
South Atlantic	1,140,000	99	1,000	1	......	..	1,141,000
Outlying Markets	1,589,000	98	25,000	2	......	..	1,614,000
	13,853,000	77	3,594,000	20	563,000	3	18.010.000

Table III—Consumption by Types of Equipment

Market Division	Hand-Fired Tons	Per Cent	Overfeed Tons	Per Cent	Underfeed Tons	Per Cent	Chain Grates Tons	Per Cent	Pulverizer Tons	Per Cent
New England	36,000	6	......	..	347,000	63	....	..	167,000	31
Mid-Atlantic	153,000	3	80,000	2	2,716,000	63	969,000	22	461,000	10
Pittsburgh	18,000	1	29,000	1	2,215,000	62	285,000	8	981,000	28
Central	96,000	3	81,000	2	1,876,000	57	13,000	..	1,177,000	38
Mid-West	80,000	2	28,000	1	227,000	6	1,306,000	33	2,329,000	58
Upper Lakes	......	..	44,000	12	154,000	43	29,000	8	133,000	37
South Atlantic	13,000	1	6,000	..	923,000	81	....	..	199,000	18
Outlying Markets	17,000	1	17,000	1	518,000	27	622,000	33	706,000	38
	413,000	2	285,000	2	8,976,000	47	3,224,000	17	6,153,000	32

Table IV—Percentage of Plants Indicating Each Item Among First Four Factors

Hand and Stoker-Fired		Pulverized Coal	
1. Fuel cost	84	1. Fuel cost	76
2. Maintenance costs	66	2. Maintenance costs	76
3. Clinkering on grates	65	3. Slagging on heating surface	52
4. Slagging on heating surface	33	4. Pulverizer capacity	48
5. Labor costs	32	5. Labor costs	28
6. Overloads on boilers	27	6. Moisture	24
7. Smoke regulations	17	7. Overloads on boilers	20
8. Fluctuating loads	15	8. Fluctuating loads	20
9. Moisture	6	9. Clinkering	20
		10. Smoke regulations	16

Table V—Major Factors in Selection by Types of Equipment

Hand-Fired		Overfeed Stokers		Underfeed Stokers		Chain Grates	
1. Fuel cost	86	1. Clinkering	93	1. Fuel cost	82	1. Fuel cost	92
2. Clinkering	61	2. Fuel cost	79	2. Maintenance	74	2. Maintenance	55
3. Maintenance	43	3. Maintenance	71	3. Clinkering	68	3. Overloads	48
4. Labor	43	4. Slagging	29	4. Slagging	42	4. Clinkering	44

Table VI—Ash-Fusion Temperature Requirements by Types of Equipment

Fusing Temp. of Ash, Deg. F.	Hand-fired	Overfeed Stoker	Underfeed Stoker	Chain-grate Stoker*	Total Solid Fuel Bed Equipment	Pulverized Coal
Under 2300	0%	7%	10%	58%	12%	40%
2300-2499	8	0	16	34	15	20
2500-2699	40	27	32	8	31	23
Over 2700	52	66	42	0	42	17

*Bituminous coal only.

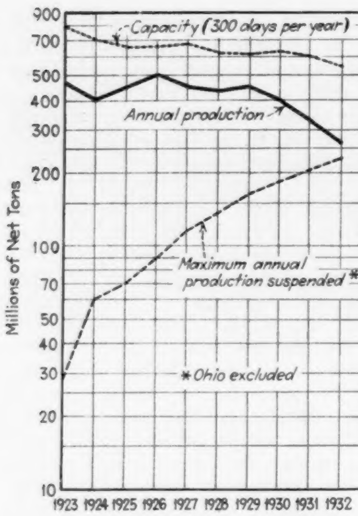


Fig. 2—Production, Capacity of Operating Mines and Maximum Annual Production of Mines Suspended (Alford).

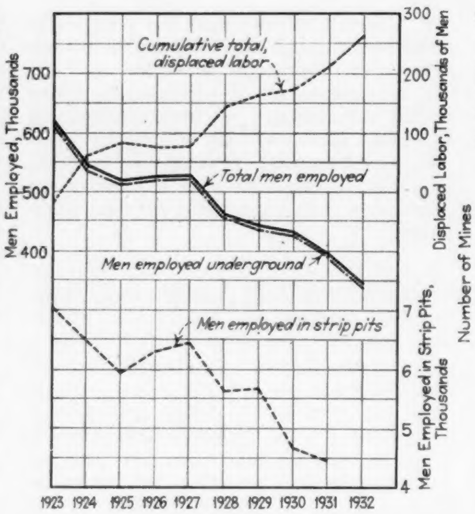


Fig. 3—Men Employed in Bituminous Mining East of Mississippi River (Alford).

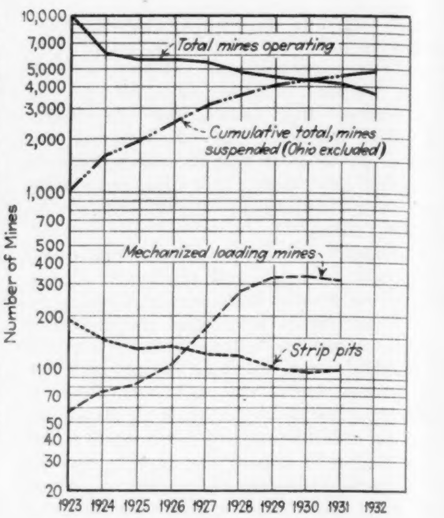


Fig. 4—Bituminous Mines Operating and Suspended; Mechanized and Strip Mines East of Mississippi River (Alford).

frame, in which were included side, end and draft sills, in 1920. In 1930, this company went to an improved casting which included the floor plate, pedestals and draft housing. This design was later changed to incorporate a new type of draft and buffing gear housed in the end sill of the casting, thus allowing the use of a depressed floor and raising the capacity to 131 cu.ft. without adding to the weight. Capacity of the 1920 car was 112 cu.ft.

During 1932, the Philadelphia & Reading Coal & Iron Co. installed 50 end-dump cars with cast-steel underframes and side buffers to allow the cars to work existing equipment. With the same dimensions, capacity of the new cars is 16 cu.ft. larger than the largest of the older types; weight was reduced 600 lb. per car. Through the use of a cast-steel bottom, the capacity of new Penn Anthracite Mining Co. cars was increased 35 cu.ft. without changing dimensions or increasing the original weight. Another anthracite company, Mr. Sheehan stated, is considering a car with individual double-bearing axles, thus allowing the cast-steel bottom to be dropped the maximum distance and increasing capacity 75 per cent to 220 cu.ft. without changing clearances.

THE results of fifteen months of field work on the occurrence and flow of gas from the Pocahontas No. 4 seam at a southern West Virginia mine were detailed in a paper by Charles E. Lawall and Lee M. Morris, School of Mines, West Virginia University, presented by the former. Holes were bored in the coal at various stations in the mine. These holes were then cased and packed to allow the pressure and flow to be determined. Supplementary holes were drilled in the roof and floor at a number of stations to show whether or not any gas came from the surrounding strata. In only one case was gas from the roof or floor observed. Supplementing the work at the mine, the gas production of six mines in West Virginia was correlated with fuel ratio and depth of cover, showing, in general, that gas output increased with a rise in fuel ratio and depth of cover.

The study showed, according to the investigators, that gas liberation is dependent upon the rapidity with which fresh coal is exposed. Gas collected at four stations in the mine showed the following analysis: methane, 85.6 to 97.7 per cent; oxygen, 1.6 to 3.5 per cent; nitrogen, 2.0 to 11.0 per cent; ethane, none. From the absence of ethane, a constituent of most natural gases, the authors concluded that migration of natural gas from underlying strata did not explain the presence of gas in the coal.

George S. Rice, chief engineer, Bureau of Mines, cited some natural gases without ethane and the presence of 30 to 40 per cent of ethane in some mine gases from the Crows's Nest Pass field, as well as the lack of solidity of the rock strata, as arguments in favor of the migratory theory. Prof. Lawall, however, took the stand that dead ribs and the general absence of gas in the roof and floor discount this theory.

The rate of suspension of bituminous mines east of the Mississippi (Ohio excepted) since 1923 and the volume of production affected, as revealed by the study of over 17,000 individual annual mine reports, were discussed by Newell G. Alford, of Eavenson, Alford & Hicks. Mr. Alford's analysis covered mines where indefinite abandonment of activity included discontinuance of pumping and ventilation. Available information indicated that exhaustion accounted for a very limited part of the suspended production. At the end of 1932, approximately 281,000 fewer men were employed east of the Mississippi than in 1923. Number of men displaced by different causes were: mechanical loading, 50,300; stripping, 6,200; improved haulage, increased use of track-mounted cutters, better management, and concentration of operations, 75,000; market loss, 149,500.

Between 1923 and the end of 1930, said Mr. Tryon, 1,335 idle mines were added to the Bureau of Mines' list. Based on experience during the last British strike, when, in spite of resumption at some mines, the bulk of the increased production came from existing operations, Mr. Tryon was of the opinion that, in the absence of car shortage, labor disturbances or other unusual conditions, the 160,000,000 tons of capacity represented by these 1,335 mines can be eliminated from the picture. Future increases in demand will mean steadier operation at plants already running.

Ore dressing and coal preparation problems were the subject of a joint meeting of the Coal Division preparation committee and the milling methods committee on Feb. 21. E. A. Holbrook, dean, School of Engineering and Mines, University of Pittsburgh, presented a paper on the "Relationship of Ore Dressing and Coal Preparation," covering face operations in coal and metal mines, crushing and fine grinding, sizing and classification, types of screens and screening surfaces, classifiers, processes and machinery used in coal preparation and ore dressing, auxiliary conveying, elevating, dewatering and drying equipment, and plant design.

D. F. Irvin, Oliver United Filters, Inc., sketched the history of dewatering fine coal, taking up the continuous settling tank, filters and rotary dryers, and the D-L-O dryer (*Coal Age*, Vol. 38, p. 7). Coal men are too prone to let the complex nature of coal cloud the cleaning issue, declared Prof. D. R. Mitchell, University of Illinois, in a written discussion. Variations in coal, in his opinion, are due largely to the presence of impurities.

The Wuensch differential density coal-cleaning process was explained in a paper by Ray W. Arms, Roberts & Schaefer Co. John Griffen, Koppers-Rheolaveur Co., detailed the development of launder washers, including the use of a regulating product in combination with the principles of stratification and free-settling as used in the Rheolaveur system.

A comparison of the objectives and results in the use of classifying, thickening, filtering and hydraulic sizing equipment in the coal and metal industries was presented by Anthony Anable, engineer, Dorr Co., Inc. Use of a six-pocket hydraulic sizer on concentrating table feed at an anthracite breaker, he declared, increased the capacity of the tables 60 per cent and resulted in a cleaner coal. G. R. Delamater, W. S. Tyler Co., discussed the problems to be met in cleaning and handling fine sizes and pointed out the need for a clean-coal standard.

At the meeting of the Coal Classification Committee on Feb. 22, under the chairmanship of A. C. Fieldner, chief engineer, Experiment Stations Division, Bureau of Mines, H. J. Rose, senior industrial fel-

low, Mellon Institute of Industrial Research, described his numerical classification of coal. The first figure gives the ash-free value for fixed carbon. That has been found more significant than the volatile matter. The second figure is the thermal equivalent of the ash-free coal in B.t.u. divided by 100, and the third is the actual B.t.u. value of the coal as received divided by 100. Thus a coal may be known as 83/140/128.

This classification avoids "harsh irritants" as the naming of the coals semi-this or sub-that just because the coal falls from grace 1 per cent, or even 0.5 per cent. In such a classification, if adopted, additional figures can be added to give other desired and subordinate information. A tolerance of 1 per cent in fixed carbon could be allowed, and perhaps 150 in B.t.u., but perhaps 100 would suffice.

When the committee talks about the classification of a coal does it give any consideration to the layer of coal in the bed being classified, or to the size of coal as it goes over the screen? asked Mr. Morrow. The fine coal will coke more readily than the large coal, probably because that

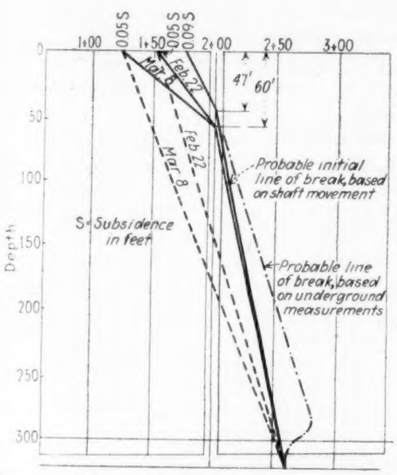


Fig. 5—**Line of Draw Varies at Depth and With Time Interval (Plein-Newhall).**

specific quality is inherent in the layer from which the fine coal mostly comes. The several layers have each their different sizing and agglomerating characteristics.

Dr. Rose declared that what the coal man really wanted to know about degradation was "size stability"; how the larger sizes would stand ill usage without breakage. This was a function of its friability, its interior strength, its degradation by atmospheric action and often of its ash content. To this list, it was suggested, should be added its method of extraction. Mr. Rose objected that this "size stability" should be based, as all other characteristics would be based, on face samples, but it was stated that shots destroyed size stability at the face and for a distance 15 ft. beyond the face, and that coal carefully treated at the tipple had often been already so weakened by the rough treatment of explosives that the coal thus tenderly loaded arrived at the consumer's plant badly shattered.

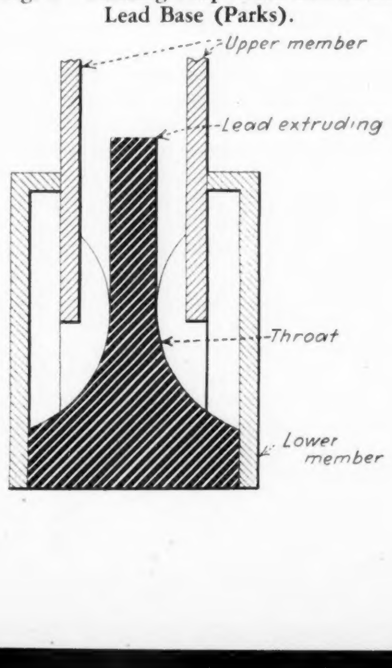
Direct cost of personal injuries, which includes only compensation and medical costs, has been found to be approximately 4 per cent of the payroll of coal-mining companies, said H. W. Heinrich, Travelers' Insurance Co., at a meeting of the health and safety committee of the institute. When indirect costs (interruption of production, property damage and related factors) are added, the total cost may run up to 16 per cent of the payroll. Man failure is the major cause of personal injuries, and management as yet is not doing its full part in its elimination, though effective eradication can be accomplished with existing personnel and methods. Compilation of records is the first step, and with these records available management then need only insist that the miner live up to his part of the employment agreement, which is to obey the rules.

SUBSIDENCE at the Montour No. 10 mine of the Pittsburgh Coal Co., at a point near the Bruceton Experimental Mine of the U. S. Bureau of Mines, with a cover nowhere exceeding 100 ft. and, in general, much less, revealed no "draw" over the retreating pillars or over the solid coal along the boundaries, said H. C. Howarth, coal-mine superintendent, Pittsburgh Experiment Station, in a paper presented by Mr. Rice, at the opening session on mining methods, Feb. 20. Mr. Howarth declared that the absence of draw probably was due to the thinness of the cover, and that draw developed only when the cover exceeded a certain minimum, the thickness of which depended on the nature of the strata, which in this case was soft and weak.

Quoting from the paper, that "a few pegs indicated upward movement over unmined coal, but investigation showed that these were loose and probably had been raised by frost," R. D. Hall, engineering editor, *Coal Age,* wondered if these were the very plugs that in case of draw would have been raised by the bending action. He suggested that the failure of these pegs to give an indication which Mr. Howarth regarded as reliable, deprived the conclusions of much of their justification.

The pegs in question, answered Mr. Rice, were those over the unmined coal at Bruceton. These, more than any, Mr. Hall added, were subject to uplift by draw. Nearly all the pegs were oak and of insufficient length to protect them against frost. As they were set and leveled Dec. 16 to 30, frost had an opportunity to disturb them before further observations were taken in the following year.

Fig. 6—Yielding Prop With Extrudable Lead Base (Parks).



Experiments had been made by the Aluminum Co. of America, said Prof. P. B. Bucky, School of Mines, Columbia University, into the possibility of replacing concrete with litharge and rubber in making tests for ascertaining the probable strength of concrete structures under stress. Instead of using a substitute of lessened strength, he preferred to use the materials of construction themselves, but of smaller though proportional dimensions to those of the prototype, and to load them as in that prototype by whirling them in a centrifuge.

In his test, he had found that cracks in the roof did not seriously lower its strength, especially if the cracks were not open. Thus a solid roof material, free from cracks, broke down with 1,600 r.p.m.; the same roof with five cracks, closed but not cemented, broke at 1,500 r.p.m., and with six such cracks at the same speed of revolution. With one grouted crack 0.05 in. wide, failure occurred at 1,680 r.p.m.

These roof slabs not only merely spanned an opening but rested on the "rib" several inches beyond the opening, a distance which would signify perhaps 100 ft. in the prototype. As he stated, the would-be roof slabs were not constrained over the would-be ribs of the excavation but were free to adjust themselves to the strain.

Grain size in the model, said B. F. Tillson, consulting engineer, New York City, should be proportional to grain size in the prototype for comparable results, which could not well be arranged by taking slabs of the mine roof for use in the model. This demand, Prof. Bucky declared, was not justified except in the case of loose sand, because there could be no motion without fracture and no friction without motion.

Mr. Tillson was not convinced with this answer. Speaking of the value of grout, he said that he had grouted roof fractures from the surface of the ground and apparently had saved the roof from collapse. He did not think that the roof thereby had been strengthened sufficiently to prevent failure, for the cementation was relatively superficial, but did believe that air was excluded to such a degree that progressive deterioration was halted, so that the original strength of the structure was preserved and that this strength was adequate for the occasion.

Measurements and other observations made around a shaft and around a schoolhouse about one-half mile distant in the withdrawal of ribs with a somewhat irregular break line at the Republic Mine, Merrittstown Shaft, near Brownsville, Pa., were described by Leo N. Plein, associate mining engineer, Bureau of Mines, on behalf of himself and F. W. Newhall, chief engineer, Northern coal mines, Republic Steel Corporation. The mine had been worked with a 25-per-cent recovery on first mining, leaving pillars 87 ft. square, so that when pillar drawing commenced the operation much resembled longwall in solid coal. Mr. Plein referred to the area from which 25 per cent of the coal had been removed as "solid coal." The cover was between 269 and 342 ft. and averaged 318 ft.

Mr. Plein also gave a new meaning to "draw." When he discovers a plug back over the "solid" coal has lowered 0.05 ft. or more, enough to cover possible errors,

(Turn to page 106)

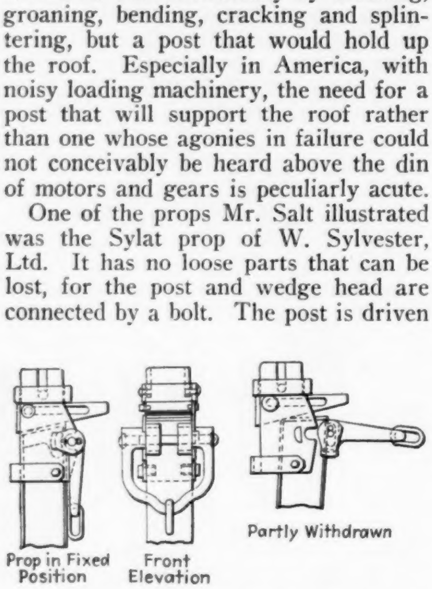
NOTES

. . . from Across the Sea

CHIEF among present-day needs in coal mining is some kind of a safety prop that can be set quickly, removed readily, and can be used over and over again. Great Britain has developed a number of props having these three characteristics and great strength also.

W. J. Salt, in an address before the Staffordshire Mining Students' Association recently, declared that what was wanted was not a wood post that would herald its own inefficiency by creaking, groaning, bending, cracking and splintering, but a post that would hold up the roof. Especially in America, with noisy loading machinery, the need for a post that will support the roof rather than one whose agonies in failure could not conceivably be heard above the din of motors and gears is peculiarly acute.

One of the props Mr. Salt illustrated was the Sylat prop of W. Sylvester, Ltd. It has no loose parts that can be lost, for the post and wedge head are connected by a bolt. The post is driven



Collapsible Steel Prop With Wedge Top

into place against the wedge, which also has a slot in it so that it can be driven out if that is desired, but apparently the prop usually is loosened by drawing it free from under the wedge by a prop drawer, the wedge itself assisting in the movement. Two cams connected by a yoke hold the prop in place against the wedge until the prop puller loosens it by dragging on this yoke. The post is of 4x4-in. H-section and may be made of any length. Posts, when under a load of 50 tons, can be withdrawn in half a minute without a heavy pull. They replace wood props of $4\frac{1}{2}$- to 5-in. diameter, which will support only half as large a load. The wedge can be removed only by heavy blows from a hammer (see illustration).

Another prop with a similar sleeve head and wedge is the Wain pit prop. It also is of H-section, either 4x4 in. or $4\frac{1}{2}$x6 in. The load does not fall on the sleeve casting but is carried by way of the wedge to the top of the prop. The present design gives an adjustable range of 1 in.

A prop known as the Helat also has a loose head, but it is so arranged that it can be revolved through about 180 deg. The revolution lengthens or shortens the prop as the bearing surfaces in the head travel up or down an inclined plane or coarse screw head, which is securely attached to the body of the prop. Lugs are provided in the head for the withdrawal of the prop by a prop puller.

Ill-shaped wooden wedges make a poor means of tightening a prop, and the difficulty of setting the post with their aid causes the miner to delay or avoid setting it. The steel wedge is more certain in operation and can be used with assured success, and the miner will be far more likely to set one promptly because it will mean only a minimum of delay.

ARE WE, in the United States, endangering the mines and wasting explosives by the use of clay stemming? This question is raised by the experiments made and operating experience obtained in British mines. J. A. S. Ritson and H. Stafford, of Leeds University, England, recently presented a paper before the Midland Institute of Mining Engineers, at Fryston, Castleford, Yorkshire, England, in which was again advocated the use of sand mixed with clay for stemming, adding just enough calcium chloride to keep the moisture intact in dry, dusty mines.

Even when a shot does useful work, clay stemming is frequently ejected from the shothole it is supposed to protect. In Fay's "Glossary of the Mining and Mineral Industry," A. A. Steel describes a "blown-out shot" as one that has blown out the stemming without breaking any of the coal except that around the auger hole." Perhaps that is correct except in its restriction to coal, but a shot may blow out and yet blow down or out the rock or coal and, though not so dangerous a shot as the one defined, is by no means a safe shot. The quantity of stemming, to return to Messrs. Ritson and Stafford, should be directly proportional to the hardness of the rock to be blasted and is not influenced by the quantity of explosive used. Slow-acting explosives, such as black powder, require about 25 per cent more stemming than high explosives.

A horizontal hole cannot readily be completely filled with sand, but by mixing coarse sand which is free from dust with 25 per cent of clay, the difficulty is overcome and the mixture is as efficient as sand alone and can be handled as readily as unmixed clay. The sand used should be of a size as nearly as practicable between 5 and 50 mesh on the Institution of Mining and Metallurgy standard, or from 0.1 to 0.01 in. over a square-mesh screen. The clay with which it is mixed should be of good quality, and the calcium chloride should be crushed to about the same fineness as the sand.

Such stemming is prepared by several methods. In one the clay is dried at 220 deg. F. and ground in a rock-dust mill so as to pass a 50-I.M.M. mesh. The finer the grinding the better, as it then will mix more readily with water. The clay is then mixed with three times that quantity of sand, and dry calcium chloride is added, in a quantity dependent on the dryness of the mine and the time the mixture must be kept before use. Three per cent serves in the average West Yorkshire mine, but sometimes 5 per cent is used. Sufficient water is added to make a stiff paste, the ingredients being mixed by a shovel or in a concrete mixer.

Another method, where no rock-dust mill is available, is to mix clay puddled in a mortar mill with water and calcium chloride till a thin mud is formed. A predetermined quantity of sand is then added, and the mill turned enough to mix the ingredients but not to grind the sand. Care should be taken to prevent comminuting the sand, and thus making it little better than clay for stemming purposes. A cement mixer may be used instead of a mortar mill to mix the mud with sand. Rock dust may be substituted for a clay in the proportion of 4 parts of sand to 3 of dust, but it is never as good as clay and may be quite unsatisfactory.

In all probability in the greater part of the United States the use of calcium chloride in the mixture would be unnecessary, though in one British colliery 75 per cent of the stemming prepared, which was formerly thrown away because it had hardened, was saved by the use of the chloride. In that colliery it had been possible to change from a nitroglycerine to an ammonium-nitrate nitroglycerine explosive costing about 19 per cent less. At this mine, shots invariably ejected the stemming of ripping rock, even though 18 to 24 in. long.

In another mine the use of sand-clay stemming reduced the consumption of explosive $16\frac{1}{2}$ per cent, though the contracting firm which used the explosive had nothing to gain from the reduction in the quantity used. At another colliery where shots ejected clay stemming, about 20 per cent of the explosive formerly used was saved by the introduction of sand-clay stemming. Shots normally of 16 oz. of explosive were reduced to 12 oz. and 12-oz. shots were cut to 8 oz. Not only did this give the best round of shots but the quantity of fumes was so reduced that the men could walk up to the face immediately after the firing of each of the five shots of the round.

At the meeting, $1\frac{1}{2}$-in. shotholes were drilled vertically in hard limestone. With a clay-stemmed shot, a tin can set over the mouth of the hole was hurled

30 or 40 ft. Where a hole had been stemmed with 30 per cent of clay and 70 per cent of sand and fired with the same weight of explosive, a similar can was barely dislodged from its place.

The question arises whether the danger of the shot blowing out at the back of the hole was not increased by reason of the tightness of the stemming. In that case it was suggested that a sheath be placed around the explosive. It was questioned also whether the use of sand in the stemming would abrade the detonator leads and cause a short circuit and misfire, but one authority replied that he had not found any misfires when using the sand-clay stemming.

Another declared that clay used for stemming at the demonstration was too soft to confine an explosive. It also was suggested that it might be possible with the better stemming to eliminate nitroglycerine and replace it by nitroglycol, which the U. S. Bureau of Mines, according to Prof. Payman, is said to have found has a slightly higher explosive power, greater sensitivity, a greater resistance to freezing and greater safety in handling than nitroglycerine.

Before introducing these methods in America or elsewhere, tests should be made at every colliery at which it is to be introduced to ascertain if the natural clay is not sandy enough, and the sand grains of a diameter to give suitable results without the addition of sand. It may be found that the stemming used at some collieries is already nearly ideal for that purpose. This change in stemming may be commended especially to operators in certain parts of the Southwest.

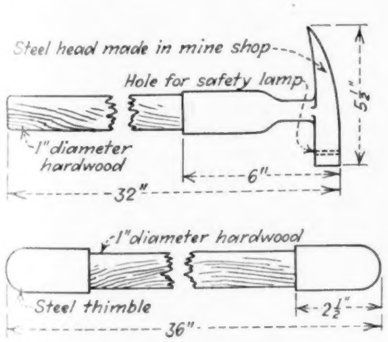
R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case is in the review notice.

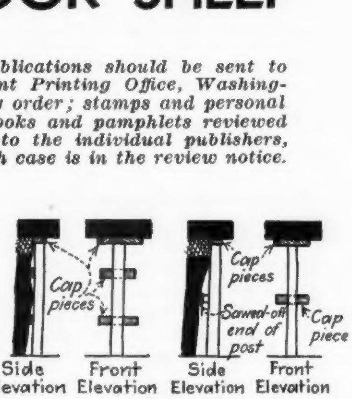
A Study of Mine Roof of the Pittsburgh Coal Bed in the Pittsburgh Mining District, by J. W. Paul and L. N. Plein. U. S. Bureau of Mines, Technical Paper 541; 98 pp. Price, 10c.

This booklet contains, strange to say, many suggestions not by any means current. One would have thought that, amid all the discussion, more of these ideas would have been presented at meetings of mining men. Designs are shown of tools for testing top and, incidentally, for holding a safety lamp against the roof.



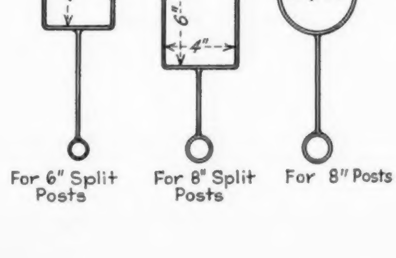
Tools for Testing Mine Roof

It is recommended that all assistant foremen carry permissible flashlights to aid in observing roof conditions; that wedges used between posts and cap pieces, the preferred position, be placed with their thin edges toward the face of the working place, so that the wedge will tighten if coal falls from the face against the post; that no posts be drawn when making a fall, unless a mechanical device be used for the withdrawal; that two men work together even if two places have been allotted to them; that the bend of a bar for prying down slate be so placed against the roof that the men using it will lift up, not down, and so will not be precipitated forward if the roof is suddenly dislodged; that posts be set against loose coal with wedges driven between a cap piece spiked on the side of the post; and that gages be given surface timbermen for ascertaining if timber is in accord with minimum specifications.



How to Sustain a Loose Rib

Gages for Surface Timbermen



These are only a few out of 45 recommendations, which possibly are not all applicable to every condition but have value for several types of operation. This publication deserves and should receive wide circulation.—R. Dawson Hall.

* * *

What Is Technocracy, by Allen Raymond. McGraw-Hill Book Co., New York City. 180 *pp. Price,* $1.50.

Although technocracy has passed from the front pages of the newspapers, the sensational development of a fever-heat interest in the movement still offers a bizarre study in social phenomena. Part of the vogue which the movement enjoyed undoubtedly was due to the jargon its publicists employed; part to the personalities of some of its leading advocates. Mr. Raymond, whose first contacts with the movement grew out of his work as a reporter for one of the metropolitan dailies, tells the story simply, swiftly and entertainingly. What the technocrats had to say about the movement, who they were and their background, the sources of technocratic inspiration and the criticisms leveled against its pronouncements are all set forth compactly and clearly. Most of the books and pamphlets poured out on the crest of popular interest were propagandistic. Primarily—and therein lies the chief value of Mr. Raymond's presentation—this book is a straightforward, impartial reportorial job. Only in the final chapter does the author voice his own opinion of the movement.

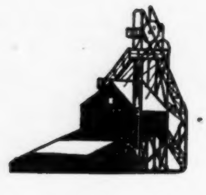
* * *

Carbonizing Properties and Constitution of Chilton Bed Coal From Boone No. 2 Mine, Logan County, W. Va., by A. C. Fieldner and seven others, U. S. Bureau of Mines. Technical Paper 542; 60 pp. Price, 10c.

About half this paper is the outcome of a detailed petrographic analysis of this interesting coal, which contains, especially at the top, much splinty material. The uppermost layer is a composite of three types of coal: semi-splint, splint and a very hard, dense splint or supersplint. These three types alternate and together form a very hard steel-gray coal, termed, by the West Virginia Geological Survey, a "gray splint." The entire bed is predominantly attrital in origin and the top layer mentioned is wholly of that character.

In the latter part of the paper are given figures on the extraction by benzine and pyridene and the rational analysis, the plastic properties as ascertained by four methods, the results of friability and accelerated slacking tests, the light oil, ammonium sulphate, gas, tar and coke from carbonization, the yield of coke and the strength of the product, the composition of the gas and its evolution by periods of carbonization.

OPERATING IDEAS



From Production, Electrical and Mechanical Men

•

Wire Rope Inspection and Maintenance Rules Adopted by Susquehanna Collieries Co.

BASING its standards on the provisions of the anthracite mining law of Pennsylvania, which states that "ropes, safety catches, links and chains shall be carefully examined every day when used, by a competent person delegated for that purpose, and any defects therein found, by which life and limb may be endangered, shall be immediately remedied," the Susquehanna Collieries Co. adopted in January a standard code for the inspection and maintenance of wire ropes and attachments, from which the following extracts are taken.

The code provides that all inspections shall be made and records kept by the master mechanic or other competent person selected by the inside foreman and approved by the superintendent, and that all records covering inspections, rope changes, resocketing, replacements of worn parts and annealing shall be filed in the office of the superintendent for reference. It is the duty of the inside foreman to examine personally and approve at least once a month all inspection reports covering both ropes and attachments, though he may, with the permission of the superintendent, delegate this work to the outside foreman. The inspector shall notify the person selected to approve reports of any hazards found or if immediate repairs are necessary.

New ropes must be long enough to permit cutting off the end for resocketing six or more times. Ropes used in shafts must be in one piece from end to end with no splices. Ropes used on slopes may be spliced, but the splice must be long enough to allow the strands to lock well into each other, and where men are handled extra care must be taken in inspection and maintenance. To prolong the life of a rope and insure maximum safety, it should be turned end for end to bring the unworn section on the drum into use at the socket, where the fatigue is greatest.

When unreeling rope, the reel must be set up on brackets or bearings, though if this is not possible, the reel may be turned on edge and rolled along the ground until the rope is unwound. Rope should never be unreeled in any other manner, for once a kink is made it cannot be removed and makes the rope unsafe. In moving a reel of rope, the bearing must always be on the flange of the reel, never on the rope itself. Small rope must be stored in a dry place, but no rope should be kept in a place hot enough to destroy the hemp core.

When a reel of rope is stored out-of-doors, the reel should be set on edge with the flanges resting on timbers, or preferably, the reel should be supported on a spindle to keep both reel and rope off the ground. Both reel and rope must be protected from the weather by a covering of boards, roofing paper or both, leaving the bottom open. First, however, a good protective lubricant should be applied to the exposed surface of the rope. Any coating material containing tar or asphalt must not be used.

While hoisting ropes usually are impregnated with a chemically neutral oil in the factory, it is desirable to lubricate a rope after installation and before it goes into service, particularly if it has been in storage for some time. Frequent applications of lubricant also are necessary while the rope is in service to preserve the core, retard corrosion, reduce internal friction and decrease external wear. A thick semi-plastic compound applied hot and in a thinned condition is most suitable, as it will penetrate while hot, cool to a plastic filler and prevent entrance of water.

If sufficiently thin, the lubricant may be poured on or applied with a brush, though special oiling equipment in which the lubricant is applied to all sides of the rope and the excess wiped off is the better method. For vertical ropes, the oiling device would be a box, while a trough would be used on slopes. In both cases, the equipment should clamp around the rope. While it is kept filled, the rope should be run through it slowly to allow the lubricant to penetrate to the rope core, the excess being recovered by a wiper. Portions which cannot be passed through the oil box should be painted. Hoisting ropes must be greased once a month, or oftener if conditions permit.

Spreader and bridle chains seldom need annealing more than once a year, unless the service is unusually severe. As frequent annealings destroy the strength of iron, chains must be replaced after six annealings. Rope clamps must fit properly and grip the rope securely without injuring the strands. They must be inspected daily and loose bolts tightened. Clevises and clevis bolts must be inspected frequently and replaced before worn excessively. As the life of springs used with king bolts has never been determined, they must be inspected daily by setting the cage on the keps and noting the presence or absence of spring recoil. Action of the safety catches and attachments must be inspected daily, and if any parts fail to work properly, immediate repairs must be made.

If any broken wire or wires are found at the fastening or near the cage bridle chain, clamp or socket, or if any wires show corrosion at the socket, the rope must be cut off and resocketed. While the interval between successive resocketings varies with the life of the rope, in no case should it be more than six months. The rope inspector shall determine when resocketing is necessary. Before resocketing, the rope must be cut off 12 in. above the clamp on the bridle chain on a cage, and at least 4 ft. above the socket on slopes. After a rope has been socketed and put in service, several trial trips should be made before men are allowed to ride.

Socket baskets must have an opening

with rounded inner edges on the small end, the opening to be slightly larger than the rope used. Size of opening should be $\frac{1}{16}$ in. larger than ropes up to and including $\frac{7}{8}$ in. in diameter; for ropes over 1 in. the opening should be $\frac{1}{8}$ in. larger. Socket baskets must be sufficiently long to allow a gradual flare of the wires. The length should graduate up from 10 in. for $1\frac{1}{2}$-in. rope to 12 in. for $1\frac{7}{8}$-in. rope. Slope rope sockets must be of the swivel type where necessary, and all sockets must be annealed and reset each time the rope is socketed. One socket for each size of rope, annealed and ready for use, must be kept at each colliery.

Annealing can best be accomplished by putting the piece in a wood fire and heating the metal slowly to a cherry red without burning the iron. The piece should be left in the fire while it slowly dies out; water must not be used for cooling. A record should be kept of each annealing of any part, so that the number of times it can safely be annealed will not be exceeded.

Rope ends should be secured properly to maintain the original relation between the tensions of the individual wires to insure maximum service and safety. When cutting wire rope, it must be laid out straight and three sets of seizings applied on each side of the cut to prevent disturbing the uniformity of the strands. Each seizing should consist of at least ten wraps of annealed iron wire of sufficient size to hold the strands in place, yet small enough to make a secure binding.

On the Spot

When quick action is needed around a coal mine, the man who gets the call is the one who has a wide variety of solutions for run-of-the-day difficulties, which he has gained through reading or in the course of his own experience. The essence of the experience of practical mining men in situations where operation required a quick and efficient short cut is gven in these pages. Here are presented a wide variety of operating and safety kinks, and here is where your idea belongs. *Coal Age* will pay for each acceptable idea $5 or more, so send it in. A sketch or photograph may make it clearer.

Safety in Shotfiring

Commenting on the position of the detonator in firing shots, as indicated in the recent description of the method of arranging leads and detonators adopted by the Susquehanna Collieries Co. to reduce the number of misfires, George S. Rice, chief mining engineer, U. S. Bureau of Mines, writes as follows:

"I note in the December, 1932, issue of *Coal Age*, p. 447, an article entitled 'Prevent Misfires in Shooting' and the illustrations of both the 'old way' and 'new way' show the detonator in the inner end of the inner cartridge.

"Careful experiments made at the coal-mining experimental stations of different countries have all shown that the detonator, when thus placed, is in the poorest place so far as effective and safe blasting effects are concerned. There is a marked advantage in placing the detonator at the outer end of the charge. This the British term 'direct initiation'; when placed at the back or bottom of the hole it is termed 'inverse initiation.'

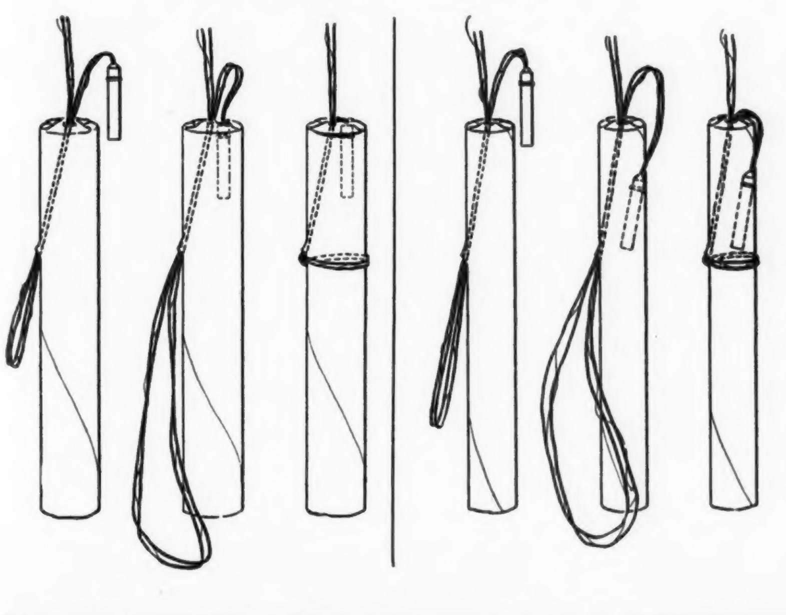
"Furthermore, if any firedamp is present, the inverse placement of the detonator favors its ignition when the charge is unstemmed or insufficiently stemmed. At the International Conference on Safety in Mines, held at Buxton, England, in 1931, a report of which appears in Safety in Mines Research Board Paper No. 74, all the station representatives approved the method of direct initiation. Dr. Beyling, for example, said (p. 52): 'The most important result obtained should be emphasized at the outset, namely, that in no instance did a safety explosive ignite firedamp if the detonator was inserted in the shothole last—that is, fired with direct initiation.'

"In Information Circular 6670, which I prepared on the international conference before the British report was issued, I quoted from Dr. Beyling's address as follows: 'The further the initiating charge or primer is situated within the charge—hence, the greater the number of cartridges between the detonator and the mouth of the hole—the greater is the flame produced. The largest flame was obtained with inverse initiation, when the detonator was situated at the bottom of the shothole.'

"Fig. 50 in the 'Blaster's Handbook' of E. I. du Pont de Nemours & Co. (reproduced herewith) shows how the detonator wire may be secured to the cartridge to prevent the detonator from being inadvertently pulled out. In fact, a hitch around the middle of the cartridge ordinarily is sufficient."

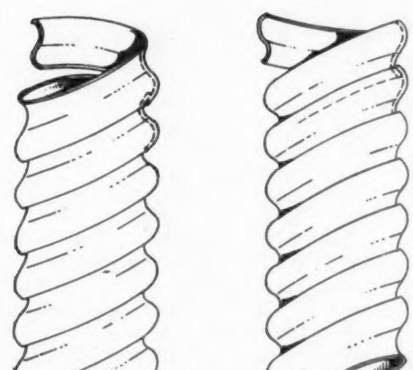
Two Methods of Priming With Electric Blasting Caps

(From the "Blaster's Handbook")



Cable Installed to Shed Water

Although armored cable of the BX type without an inner sheath of lead is not built for outdoor service or for other service where water drops on it, installation should be made in such a way that the metal tape forming the sheath laps in the proper way to shed water instead of guiding the water to the inside. The view to the left of the accompanying sketch illustrates the correct position. Turning the cable the other end up, as at the right, invites water to enter.



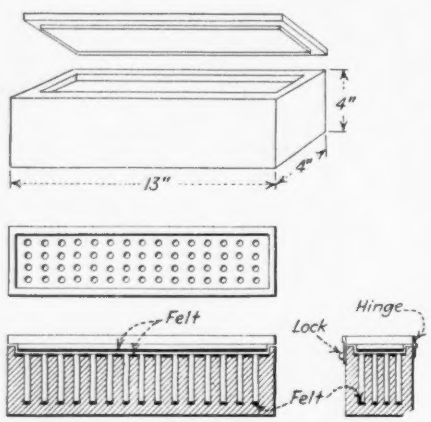
Left Sheds, Right Invites

This precautionary measure in the in-

stallation of BX cable applies particularly to those preparation plants in which water is used. Water, of course, is not supposed to come in contact with the power and light cables, but it is not unusual in case of overflows or leaks.

Safety Detonator Box

A block of oak timber and an old felt hat comprise the materials used in making the safety detonator box adopted by the Knox Consolidated Coal Co. The block is chiseled out to make a recess for the lid, as shown in the accompanying sketch by Thomas James, Vincennes, Ind., and holes are drilled to hold the detonators. Depth of the holes is just sufficient to allow the caps to project slightly above the felt top, which is glued to the wood. Holes are punched in the felt to correspond with the drillholes, and the punchings are pushed to the bottom to act as a cushion. A felt pad also is glued to the lid, which is equipped with a hasp and hinges. Dimensions in the figure are for a 60-detonator box.



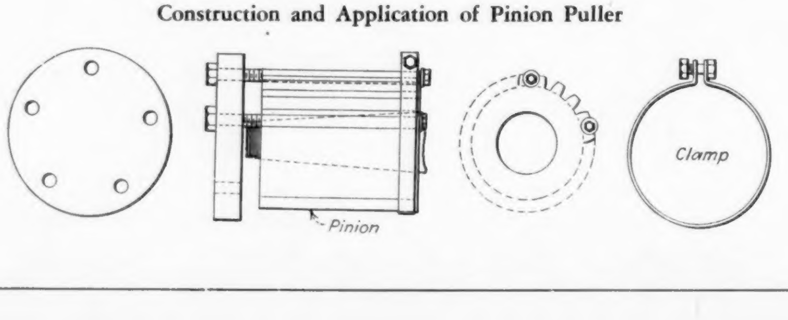
Construction Details, Safety Detonator Box

Pinion Puller

John J. Nolan, Terre Haute, Ind., offers the puller described below for use in removing all types of pinions, especially in cases where the clearance back of the pinion is narrow and the slot depth is shallow. A further advantage pointed out by Mr. Nolan is that the puller may be made easily from material to be found in almost any mine repair shop.

The essential parts consist of a circular steel plate, the desired number of bolts, and a clamp. Size of bolts is dependent upon the pressure required to remove the pinion, but they should fit fairly snugly in the grooves between the pinion teeth. The clamp is applied to prevent the bolts from rising up out of the grooves when pressure is applied. According to Mr. Nolan, this puller exerts a more equal pressure all around the pinion than some side strap or arm type pullers, and also eliminates binding. By drilling a series of holes, the same plate can be used on a number of pinion sizes, provided the variation is not too great.

Construction and Application of Pinion Puller



Safety Warnings by Phonograph

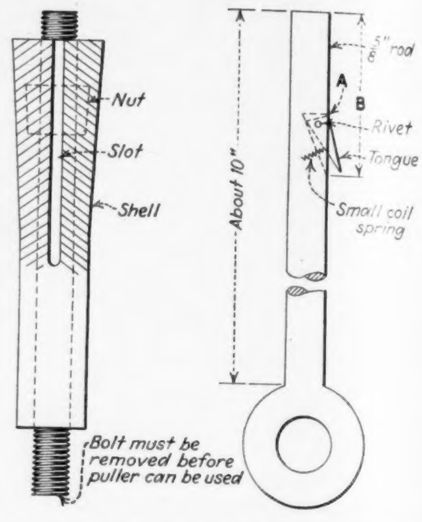
At the Wyndham colliery, in Wales, miners about to descend into the pit are warned by voice of the chief dangers to be encountered, it is reported. This warning is transmitted through phonograph records and loud speakers, and is changed from day to day to avoid monotony. A typical example follows:

"Hello! Manager calling! Safety first! Search your pockets for matches before you go down into the pit. Don't carry tools and blocks of timber in the cage with you. Take care of your safety lamps; hang them up in a safe position. Don't walk the engine plane when the ropes are in motion. Don't go in front of trams where the gradient is over 3 in. per yard. You must not work under overhanging coal or ground unless securely spragged. Haulers, take care of the horses in your charge; don't abuse them; treat them kindly; take your horses safely to the stables at the end of the shift. Cases of ill-treatment will be severely dealt with."

The voice system was adopted by D. Llewellyn Richards, mine manager, after he had found that printed warnings soon lost their power to interest or attract. It is reported that accidents have been reduced since the adoption of the system.

Tool Removes Hanger Shells

In view of the difficulty experienced in recovering malleable-iron mine-hanger shells in abandoned territory by ordinary methods, the tool described in this article has been developed by Robert Andrews, New Jellico Coal Co., Morley, Tenn. As shown in the illustration, the basic part of the tool is a short length of ⅝-in. rod, slotted near the upper end for a steel tongue. This tongue pivots on a $\frac{3}{16}$-in. rivet so that the point can be pushed outward at the bottom by a small coil spring.



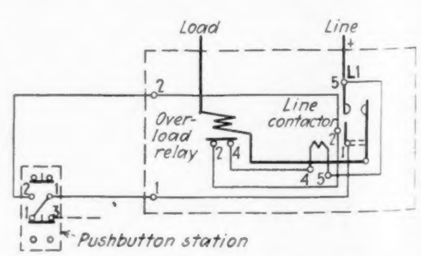
Construction Details of Tool for Removing Hanger Shells

In using the tool, the bolt is first removed from the hanger shell. The tool is pushed up far enough to force up the nut and allow the point of the tongue to catch in the shell slot. A slight pull then removes the shell. As the tongue should swing out just sufficiently to engage the bottom of the slot, the total movement must be adjusted at *A*. The length *B* should be just sufficient to push the nut to the top of the shell before the tongue engages the slot.

Positive action in removing the shells is one of the major features of this tool; others are simplicity and low cost. Not more than one minute is required in removing any shell, experience has shown.

Feeder Circuit Breaker Can Be Remotely Controlled

Susquehanna Collieries Co. and the Lytle Coal Co. have installed a number of simplified direct-current feeder circuit breakers which can be opened and closed from remote pushbutton stations. The assembly (General Electric CR3171Y1 protective panel, developed at the suggestion of Susquehanna engineers) consists of a single-pole contactor with overload relay and pushbutton mounted on a suitable panel. While the contactor can be opened and closed from a remote station, it cannot be held closed by the pushbutton.



Wiring Diagram, Feeder Circuit Breaker

WORD from the FIELD

Hold Davis-Kelly Coal Bill To Be Unconstitutional

In accordance with the views expressed by representatives of the bituminous industry in hearings last year, the Davis-Kelly coal control bill was branded as unconstitutional in the majority report of the Senate Subcommittee on Mines and Mining, submitted orally late in February. The constitutionality of the Hayden substitute bill (S. 2935), which would force operators into pooling organizations through use of the tax power, also was questioned, although the late Senator Walsh did express the opinion that the proper approach to federal control was through the tax power.

Following consideration of the report of the subcommittee, Senator Hayden stated that he intended to revise his bill, retaining the taxation features, and press it in the new Congress. Representative Kelly, Pennsylvania, declared that the original form of the Davis-Kelly bill would be abandoned, but that he would introduce another measure to accomplish the same purposes.

Hard-Coal Rate Cut in April

A reduction of $1 per ton on anthracite freight rates to Chicago, with corresponding reductions to intermediate points in the territory west of the Pittsburgh-Buffalo line, was scheduled for April 1 at a meeting of the Presidents' Traffic Committee of the Eastern Railroads, held in New York City Feb. 16. The cut also will apply to Great Lakes points and to Toronto, and was made with the understanding that substantial price reductions would be put in force by anthracite operators and dealers in the territory affected.

Utah Bill Would Regulate Coal

A bill to place the Utah coal industry (mining, distribution and retailing) under the control of the state Public Utilities Commission passed the state senate early this month. The object of the measure, according to the author, is to feel out the ground ahead as a forerunner of stabilization. The bill is supported by organized labor, the natural gas interests and several coal operators. Opponents allege that the bill would raise prices and perpetuate monopoly.

Princeton Building Power Plant

The Princeton Mining Co. is installing a 2,000-kw. power plant at its Kings Station mine, Princeton, Ind., equipped with two 500-hp. Babcock & Wilcox boilers, pulverized-coal firing system

and two 1,000-kw. turbo-generators. Capacity of the mine is 4,000 tons in two shifts, and 1¼-in. screenings with an ash content of 11.5 per cent will be used as fuel. The estimated annual saving, according to R. J. Smith, president, will be $25,000, in part due to the elimination of the demand charge of $1.50 per kilowatt, aggregating $1,000 per month.

A.M.C. Program Committee Headed by Thomas

L. N. Thomas, vice-president, Carbon Fuel Co., Carbon, W. Va., has accepted an appointment as chairman of the program committee for the tenth annual convention of practical coal operating men, to be held in Pittsburgh, Pa., the week of May 8 under the auspices of the Manufacturers' Section, Coal Division, American Mining Congress.

Chairmen of sectional committees have been selected as follows: Pennsylvania, Ohio and northern West Virginia, J. William Wetter, general manager, bituminous mines, Madeira, Hill & Co.; southern West Virginia, H. B. Husband, general manager of coal mines, Chesapeake & Ohio Ry.; Kentucky-Virginia-Tennessee, Harry LaViers, assistant manager, North East Coal Co.; Southwest, L. Russell Kelce, vice-president in charge of production, Sinclair Coal Co.

Coal Production Up

Bituminous production rose to 27,220,000 net tons in February, according to preliminary estimates by the U. S. Bureau of Mines. Output in January was 27,060,000 tons, while the February, 1932, production was 28,013,000 tons. Anthracite production last month was 4,273,000 net tons, against 3,807,000 tons in January and 4,019,000 tons in February, 1932.

Total production of bituminous coal in the first two months of this year was 54,280,000 tons, a reduction of 2.9 per cent from the total of 55,905,000 tons in the same period in 1932. Anthracite production in the first two months of 1933 was 8,080,000 tons, an increase of 2.1 per cent over the output of 7,916,000 tons in the first two months of 1932.

New Plant Construction

New contracts for topworks construction at various coal operations were reported as follows in February:

Avis-Eagle Coal Co., Neibert, W. Va.; contract closed with Kanawha Mfg. Co. for five-track tipple equipped with shaker screens, loading booms, refuse and mixing conveyors, house-coal conveyor and slack conveyor; capacity, 200 tons per hour.

Commercial Fuel Co., Pittsburg, Kan.; contract closed with McNally-Pittsburg Mfg. Corporation for Norton coal cleaning plant; capacity, 125 tons of 1¼x0-in. coal per hour.

Edgefield Coal Co., Canton, Ohio; contract closed with American Coal Cleaning Corporation for one American air separator and auxiliary equipment for cleaning ¾x0-in. coal; capacity, 30 tons per hour; to be completed March 25.

Philadelphia & Reading Coal & Iron Co.; contract closed with Hydrotator Co. for two 19-ft. Hydrotator classifiers to condition the feed to a No. 4 buckwheat Hydrotator at the St. Nicholas breaker. The two classifiers will receive the entire breaker wash water, and will separate the 30- to 40-mesh material from the minus 3/32-in. fines, the large material going to the Hydrotator and the minus material, or classifier overflow, going to the Dorr thickener. Capacity is 7,000 gal. per minute, containing about 130 tons per hour of solids, of which 65 tons per hour will be recovered as Hydrotator feed.

Income Tax Regulations

Three principles dealing with the expensing of certain items of plant and equipment, percentage depletion and value used in computing gross income, advocated by the National Coal Association, have been adopted by the Income Tax Bureau for application on returns filed under the Revenue Act of 1932. The new regulations provide that expenditures for plant and equipment and replacements that do not increase the value of the mine, decrease the cost of production, or do not represent the cost of restoring property or making good the cost of exhaustion for which an allowance is made, shall be deducted as necessary business expenses.

The taxpayer, in his 1933 return, must make a final choice for each property as to the method of computing depletion and such method must be followed in succeeding years, even though ownership changes. For 1932 and 1933, the percentage depletion allowance shall not be less than it would be if computed on the basis of cost or 1913 value; this protection lapses after 1933. Gross income from a mining property shall be determined by the value of the coal as it is loaded for shipment, rather than its value as it leaves the mine mouth.

Move to Reduce Anthracite Wages Fails; Illinois Union Accepts Lewis Rule

ANTHRACITE wages were left unchanged by the failure of the arbitration board to agree on a reduction last month. Frank Morrison, secretary, American Federation of Labor, representing the miners on the board, and George Rublee, a former member of the Federal Trade Commission, representing the operators, announced their disagreement at Washington, D. C., March 1. Due to the refusal of Mr. Morrison to consider any reduction whatsoever, on the ground that reductions in other industries had refuted claims that cuts would stimulate production and employment, the question of how much wages might be reduced never came before the board. Mr. Morrison also blocked Mr. Rublee's proposal that the board add a third member.

Both arbiters united in proposing that operators and miners jointly petition the Interstate Commerce Commission for a reduction in freight rates and recommended that the permanent committee of six operators and six miners provided for in the 1930 agreement begin consideration of anthracite problems as a first step in reducing operating costs, increasing safety and eliminating destructive competition, though Mr. Morrison would bar wage reductions as a topic for discussion.

After nearly 3½ years of independence, featured by bitter legal battles, control of the Illinois union (District 12) went back into the hands of the international officers of the United Mine Workers on March 1. The District 12 executive board agreed to the removal of legal restraints against the parent organization early in February to secure the international union's assistance in the fight against the insurgent Progressive Miners of America, and later moved for dissolution of the 1929 injunction against interference in Illinois affairs.

Further attempts by Governor Horner to reconcile the warring factions in the state took the form of passage of a resolution for an investigation by the Illinois legislature, providing for the appointment of a commission of nine members (three Senators, three Representatives and three citizens selected by the Governor) to carry out the project. The commission started to function on Feb. 16, and outlined a series of hearings at which both sides will present their cases.

Insurgents were successful in forcing a temporary shutdown of the No. 15 mine, Old Ben Coal Corporation, and the Black Arrow No. 19 mine, Peabody Coal Co., West Frankfort, early in February. Refusal of the insurgents to cooperate caused the Cosgrove-Meehan Coal Corporation of Illinois to announce the permanent closing of its Panama mine.

Iowa coal miners by a vote of 2 to 1 rejected a new wage agreement carrying the same reductions as the Illinois contract ($1.10 in the basic day rate and 23c. per ton for pick mining) in February. The proposed scale was referred back to a joint committee representing the miners and the Iowa Coal Operators' Association. The old agreement expires March 31.

Establishment of compulsory physical examinations by the Susquehanna Collieries Co., Nanticoke, Pa., as a result of proposals by the State Department of Labor for legislation to curb occupational diseases, brought the company into conflict with U.M.W. locals 211 and 898 last month. Both locals took the stand that examination would jeopardize the places of older men, and threatened members submitting to examination with expulsion.

Would Restrict Coal Imports

Nova Scotia coal operators moved last month for a restriction of imports of soft coal as a means of stimulating the industry in the province. In some quarters it is suggested that eastern Canada be allocated to the Maritime producers through the establishment of an embargo or a quota system on imports from foreign countries.

Freight Rate Hearing Deferred

The hearing to determine whether or not the Interstate Commerce Commission shall enter into an investigation of freight rates, as requested by the National Coal Association and lumber and farm organizations, has been postponed from Feb. 25 to March 24. This action was taken at the request of the carriers.

1932 Financial Reports Issued

Colorado Fuel & Iron Co. and subsidiaries report a net loss of $4,253,261 in 1932 after interest, depreciation, depletion, federal taxes and other charges. Net loss in 1931 was $3,363,207.

Glen Alden Coal Co. and subsidiaries (including Delaware, Lackawanna & Western Coal Co.) report a net income of $1,791,348 in 1932 after depreciation, depletion, royalties, interest, federal taxes and other charges, equal to $1.02 a share on 1,750,337 shares outstanding. The 1931 earnings of the company, excluding subsidiaries, totaled $7,391,409, equal to $4.01 on 1,844,537 shares.

Hudson Coal Co. reports a net loss of $2,136,824 in 1932 after interest, depletion and depreciation. This compares with a net loss of $729,777 in 1931.

Intercolonial Coal Co., Ltd., for the year 1932, reports a net profit of $30,428 from all sources and after taxes. This compares with a net profit of $15,011 in 1931.

Lehigh Valley Coal Corporation and subsidiaries report a net loss of $1,183,283 in 1932 after taxes, interest, depreciation, depletion and other charges, compared with a net income of $957,321 in 1931, equal to 21c. a share on 1,202,698 no-par common shares after dividends on the minority stock of the Lehigh Valley Coal Sales Co. and the preferred stock of the corporation.

Pennsylvania Coal & Coke Corporation and subsidiaries, for 1932, according to quarterly reports, incurred a net loss of $270,227 after depreciation, depletion, taxes and other charges. Loss in 1931 was $290,127.

Philadelphia & Reading Coal & Iron Co., according to a preliminary report, incurred a net loss of $4,868,603 in 1932. This compares with a net profit of $1,360,295 in the preceding year.

Pittsburgh Coal Co. and subsidiaries report a net loss of $2,882,580 in 1932, after expenses, taxes, depletion, depreciation and other charges. Net loss in 1931 was $2,300,418.

United Electric Coal Cos., for the six months ended Dec. 31, report a net profit of $21,956 after depreciation, depletion, interest, federal taxes and other charges. This compares with a net profit of $175,887 in the corresponding period in 1931.

Virginia Iron, Coal & Coke Co. reports a net loss of $33,252 in 1932 after interest, depreciation, depletion, taxes and other charges but before adjustments. Net profit was $110,353 in 1931, equal after preferred dividends, to 10c. a share on 100,000 common shares.

Koppers Interests Merge

A merger of coal mines, sales agencies, steamship lines and dock companies of the Koppers interests is being effected by Eastern Gas & Fuel Associates. Properties affected are those of the New England Coal & Coke Co.; Castner, Curran & Bullitt, Inc.; C.C.B. Smokeless Coal Co.; New England Fuel & Transportation Co. (Federal Mines); Koppers Coal Co. and subsidiaries; and the Mystic Steamship Co. All will be grouped under the new Koppers Coal & Transportation Co., which will be headed by J. P. Williams, Jr., president of the Koppers Coal Co.

Bertha-Consumers Mines in Deal

Mines of the old Bertha-Consumers Co. in the western Panhandle of West Virginia were purchased by Marshall J. H. Jones, president, Associated Coal Co., Pittsburgh, Pa., at a receiver's sale last month. The consideration was $15,000 and the sale is contingent upon court approval.

Permissible Plates Issued

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines in January and February, as follows:

(1) Ingersoll-Rand Co.; "Tugger" hoist; 20-hp. motor, 440 volts, a.c.; Approval 251A; Jan. 16.

(2) Goodman Mfg. Co.; Type 85A pit-car loader; 3-hp. motor, 440 volts, a.c.; Approval 252A; Feb. 20.

(3) Goodman Mfg. Co.; Type 724EJ slabbing machine; 70-hp. motor, 500 volts, d.c.; Approval 253A; Feb. 25.

Natural Gas Active

Contracts for supplying natural gas to service companies in Philadelphia and adjacent southeastern Pennsylvania are expected to be signed soon by the Columbia Gas & Electric Co., according to reports current last month. Eventual expansion into New Jersey is visioned by the company. The gas will be supplied, provided the agreements go through, from West Virginia, Kentucky and Ohio fields through new high-pressure lines built in 1930.

A $400,000 advertising campaign to stimulate the sale of gas appliances is planned by the Pacific Gas & Electric Co., according to an announcement made in February. The campaign will be carried on in cooperation with appliance dealers.

Oppose Bureau of Mines Shift

Rejecting suggestions that the U. S. Bureau of Mines be transferred to some other department, the board of directors of the Coal Mining Institute of America and the executive committee of the Mine-Rescue Veterans of the Pittsburgh District on Feb. 4 adopted resolutions approving the present status of the bureau in the Department of Commerce and opposing any transfer or change in organization which might affect existing safety and technical work.

Wants Federal Aid for Research

A federal subsidy for coal research is absolutely essential, and the industry must turn to manufacturing and develop new marketing practices, declares Dr. A. W. Gauger, director, mineral industries research, Pennsylvania State College. "When one considers the important role that fuels have played in the industrial development of this country, the amount of subsidized research that is carried on is appallingly little," he asserted. Research also is needed for better preparation, lower costs and greater convenience.

Power Rates Reduced

Southern West Virginia coal mines are expected to benefit to the tune of $300,000 per year as a result of reductions from $1.50 to $1.25 per kilowatt-hour of the integrated monthly demand charge made by the Appalachian Electric Power Co. last month after an informal investigation by the Public Service Commission some months ago.

N.C.A. Annual Meeting Plans Get Under Way

Ways and means by which district associations can serve their membership and the industry as a whole will be a feature of the luncheon meeting of officials and members of such organizations at the annual meeting of the National Coal Association, Drake Hotel, Chicago, June 15-17. R. H. Sherwood, chairman, Coal Trade Association of Indiana, will preside, and William G. Caperton, president, Smokeless Coal Operators' Association of West Virginia, will lead the discussion.

Fuel distribution will be the theme of the forenoon session on June 16, with W. J. Jenkins, president, Illinois Coal Operators' Association, presiding. A feature of the meeting will be an address on "Credit Protection" by W. J. Magee, president, National Coal Credit Association. A sectional meeting of members of the credit association will be held in the afternoon.

Obituary

W. L. A. Johnson, president, Rayville Coal Co., and joint interstate commissioner, Southwestern Interstate Coal Operators' Association, died at his home in Kansas City, Mo., Feb. 7. Mr. Johnson, at

The Late W. L. A. Johnson

one time an officer of the United Mine Workers in the Southwest, was connected with the association for more than twenty years and was a leader in the negotiation of wage contracts and the settlement of disputes.

Samuel M. Harrison, 51, superintendent, Buttonwood colliery, Glen Alden Coal Co., died at his home in Scranton, Pa., Feb. 3.

B. Dawson Coleman, chairman of the board, Ebensburg Coal Co. and Coleman & Co., died at his home in Philadelphia, Pa., March 3, after an illness of several months. Mr. Coleman also was president of the First National Bank of Lebanon and a director of several other financial institutions.

Charles W. Tucker, master mechanic, Maryland division, Consolidation Coal Co., with headquarters at Frostburg, died Feb. 14. Mr. Tucker's connection with Consolidation dated back over 40 years.

J. S. Stearns, 88, president, Stearns Coal & Lumber Co., Stearns, Ky., and founder of the Stearns coal and lumber interests, died at his home in Ludington, Mich., last month.

Future of Smoke Control Outlined

The next logical development in the fight on atmospheric pollution will be the establishment of air hygiene districts which will cover and control metropoliton smoke areas, declared H. B. Meller, head of air pollution research, Mellon Institute of Industrial Research, in an address before a gathering of borough officials at Pittsburgh, Pa., Feb. 23. In defining the boundaries of these districts, he said, state and county lines must be disregarded for effective control.

Personal Notes

J. B. Thomas, general superintendent, western division, DeBardeleben Coal Corporation, Birmingham, Ala., was appointed general superintendent of all the company's mines in February.

William J. Higgins, Wyoming, Pa., for the past sixteen years a mine foreman at the Ewen colliery, Pittston Co., has accepted a similar position with the Susquehanna Collieries Co.

Harry T. Ewig, Cleveland, Ohio, was elected president of the Valley Camp Coal Co. on Feb. 13. Mr. Ewig, who succeeds the late James A. Paisley, joined the company seventeen years ago, and has been treasurer for ten years, which position he retains. William Taylor, formerly with the North American Coal Corporation, was elected senior vice-president.

Industrial Notes

Henry S. Beal, general manager, Jones & Lamson Machine Co., Springfield, Vt., was elected president of the Sullivan Machinery Co. with headquarters at Chicago, Feb. 24. Mr. Beal succeeds Arthur E. Blackwood, who becomes chairman of the board of directors. Mr. Beal was born in Rockford, Ill., in 1888; was graduated from Dartmouth and also studied at the University of Berlin. He started in 1909 with Jones & Lamson as machinist and was successively traveling demonstrator, in charge of cost work; sales manager, assistant general manager and general manager. For the past three years he has been a director of the National Machine Tool Builders' Association and is now its president.

National Wood Pipe Co., a new organization, has acquired the Standard Wood Pipe Co. property at Williamsport, Pa., and will manufacture and sell a full line of wood pipe.

Keith Dunham Co. has removed its offices to 205 West Wacker Drive, Chicago.

J. W. Wilson, for the past twenty years associated with the Link-Belt Co. in the design of coal-preparation plants, has joined the McNally-Pittsburg Mfg. Corporation, Chicago, in an engineering and sales capacity.

William W. Dodge has resigned as managing editor of *Product Engineering*, a McGraw-Hill publication, to act as adviser on product design and as Eastern business representative for Joseph Sinel,

Lucian Bernhard and Helen Dryden, industrial artists, with headquarters at 330 West 42d St., New York City.

CANADIAN OHIO BRASS CO., LTD., has sold its manufacturing property at Niagara Falls, Ontario, Canada, to Welland Securities, Ltd., and is contemplating the erection of a new plant in the same city. The old plant will be occupied until plans are completed.

ROBERT D. BLACK, formerly advertising and sales promotion manager, has been appointed sales manager for the Black & Decker Co.

New Classification Committee

A subcommittee (V) on "Classification Boundary Lines," headed by W. A. Selvig, chemist, Pittsburgh Experiment Station, U. S. Bureau of Mines, was organized at a meeting of the Technical Committee on the Scientific Classification of Coal, in New York City, Feb. 22. The new subcommittee will endeavor to find lines of demarcation between the various United States and Canadian coals. Other committee members are: T. A. Hendricks, assistant geologist, U. S. Geological Survey, Washington, D. C.; G. H. Cady, senior geologist, Illinois Geological Survey, Urbana, Ill.; G. H. Ashley, Pennsylvania state geologist, Harrisburg, Pa.; R. E. Gilmore, superintendent, Fuel Research Laboratories, Mines Branch, Department of Mines, Ottawa, Canada; Edgar Stansfield, industrial research department, University of Alberta, Edmonton; B. R. MacKay, geologist, Survey Branch, Mines Department, Ottawa.

Mr. Selvig also was elected executive secretary of the technical committee on classification, and will assist W. T. Thom, associate professor of geology, Princeton University, Princeton, N. J., who continues as secretary. The technical committee also voted to form a subcommittee on nomenclature to number probably seven members.

Coming Meetings

Canadian Institute of Mining and Metallurgy; annual meeting, April 4-6, Royal York Hotel, Toronto, Ontario, Canada.

Ohio Safety Congress; annual meeting, April 25-27, Neil House, Columbus, Ohio.

Mine Inspectors Institute of America; annual meeting, May 8 and 9, William Penn Hotel, Pittsburgh, Pa.

American Mining Congress; annual convention and exposition, May 10-12, Pittsburgh, Pa.

Indiana Coal Producers' Association; annual meeting, June 6, Terre Haute, Ind.

National Coal Association; annual meeting, June 15-17, Chicago, Ill.; annual dinner, June 16.

American Society for Testing Materials; annual meeting, June 26-30, Chicago, Ill.

Sixth Midwest Engineering and Power Exposition; during week of June 26, Coliseum Bldg., Chicago, Ill.

Ohio Coal Conference; annual meeting, July 10-12, Cedar Point, Ohio.

Mine Fatalities Down

Coal-mine accidents caused the deaths of 58 bituminous and 24 anthracite miners in January, 1933, according to information furnished the U. S. Bureau of Mines by state mine inspectors. This compares with 162 bituminous and 38 anthracite fatalities in December, 1932, and 82 bituminous and 15 anthracite deaths in January, 1932. The death rate at bituminous mines dropped from 5.21 in December to 2.14 in January, while the anthracite rate declined from 7.47 to 6.30. Comparative figures are as shown in the next column:

BITUMINOUS MINES

	Jan., 1933	Dec., 1932	Jan., 1932
Production, 1,000 net tons...	27,060	31,110	27,892
Fatalities..................	58	162	82
Death rate per 1,000,000 tons	2.14	5.21	2.94

ANTHRACITE MINES

	Jan., 1933	Dec., 1932	Jan., 1932
Production, 1,000 net tons...	3,807	5,089	3,897
Fatalities..................	24	38	15
Death rate per 1,000 000 tons	6.30	7.47	3.85

Comparative fatality rates for the months of January, 1932 and 1933, by causes, are given in the following table.

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

Cause	Bituminous		Anthracite		Total	
	Number killed	Killed per million tons	Number killed	Killed per million tons	Number killed	Killed per million tons
January, 1932						
Falls of roof and coal	43	1.542	8	2.053	51	1.604
Haulage	16	.573	3	.770	19	.598
Gas or dust explosions:						
Local explosions	1	.036	..	.....	1	.031
Major explosions	6	.215	..	.....	6	.189
Explosives	1	.036	1	.256	2	.063
Electricity	6	.215	..	.....	6	.189
Machinery	2	.072	..	.....	2	.063
All other	7	.251	3	.770	10	.314
Total	82	2.940	15	3.849	97	3.051
January, 1933						
Falls of roof and coal	30	1.108	16	4.203	46	1.491
Haulage	12	.443	4	1.050	16	.519
Gas or dust explosions:						
Local explosions	3	.111	2	.525	5	.162
Major explosions	..	.....	..	.....	..	.....
Explosives	2	.074	..	.....	2	.065
Electricity	4	.148	1	.263	5	.162
Machinery	1	.037	..	.....	1	.032
All other	6	.222	1	.263	7	.226
Total	58	2.143	24	6.304	82	2.657

* All figures are preliminary and subject to revision.

Discuss Economic and Technical Problems

(Concluded from page 97)

he declares the point of subsidence to be the point of draw, and the angle between a vertical and a line joining that point of subsidence to the floor of the coal at the coal face to be the "angle of draw." Thus with him "draw" is "subsidence" or "creep" over the "solid" coal. In no case did he find any elevation of the surface over the "solid," though he found such elevation in points over the schoolhouse, which has horizontal dimensions of 175x 100 ft. One corner of the schoolhouse actually rose 4 in. as mining progressed.

The speaker asserted that the true "angle of draw" cannot be ascertained when a rib line is retreating rapidly, because the overlying rocks do not always adjust themselves to their new stresses as rapidly as the rib line retreats. Thus the draw in one case increased from 3 deg. 39 min. to 14 deg. 36 min. Mining operations were conducted with much broken time, and when the face stood still, the angle of draw increased.

Where the break line approached a shaft, the subsidence exhibited itself in the shaft; not in the direct line of draw, but 60 ft. down from the top of the shaft. From this point, the line of draw extended to the surface along one of two lines, one of which developed after a few days' delay. Mr. Plein declared that there was no great change in the nature of the strata from the coal to the surface, except that at the top about 2 ft. of weathered material was found, and that broken rock was encountered for a depth of 20 ft. in the shaft.

A prop, said R. D. Parks, associate professor, mining engineering, Michigan College of Mining and Technology, should support the load put on it till the load reaches a certain figure within its elastic limits, and then should give way under any increased load so as to continue to exercise resistance while still permitting movement —that is, should retreat still fighting. The new prop he has devised gives a regularly increasing resistance with load until a certain pressure is attained, when it yields. It was found that thereafter the prop would exercise a resistance equal to 90 per cent of the maximum load, with, however, a gradual reduction in the length of the prop.

The upper part of the prop may be a tube or other shape. At the lower end this upper part flares out and rests on a plug of lead set in the lower part of the prop. When excessive pressure comes on the post, the lead is extruded into the upper part of the prop, and, by arranging a proper throat through which the extruded lead may be made to pass, the resistance can be varied to accord with average conditions of movement. None of these props has as yet been used.

WHAT'S NEW
IN COAL-MINING EQUIPMENT

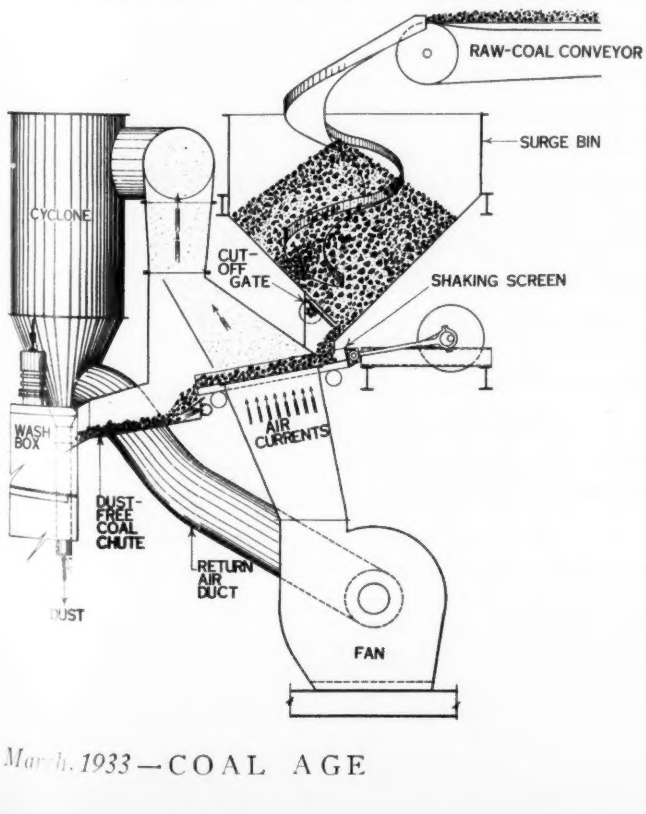
Dust Extraction System

Link-Belt Co., Chicago, has acquired the rights to manufacture and sell the Simon-Carves dust-extraction and collection system in the United States. Operation of the system is shown in the accompanying illustration. Raw coal is brought to the system by conveyors or elevators, and is delivered by spiral chute to a surge bin. This bin is equipped with a control gate which regulates the rate of feed to a 150-r.p.m. shaker screen.

Dedusting is accomplished by blowing air through the coal as it passes over the screen surface. The dust-laden air goes to a cyclone separator, while the dedusted coal is discharged into a washer or storage bin, as desired. After passing through the separator, the clean air is recirculated by a fan. The entire system is driven by a single 20-hp. motor through the use of a countershaft.

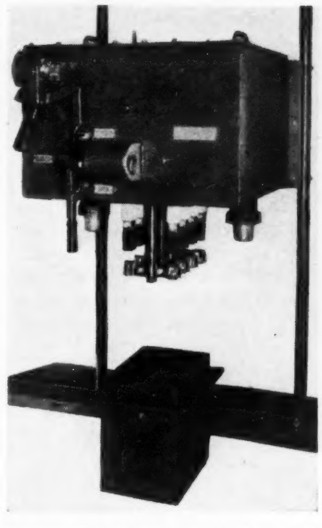
Cascading of the coal is eliminated, the company points out, and dust is removed from the air before it is recirculated by the fan. Use of a 4½-ft. cyclone separator for the entire dust-removal operation, according to the company, reduces materially the space needed for installation of the system and makes for a compact unit. It is asserted that a plant with a capacity of 50 tons per hour can be driven by a 20-hp. motor.

Simon-Carves Dust Extraction and Collection System.



Circuit Breakers

General Electric Co., Schenectady, N. Y., has developed a combination oil circuit breaker and group-operated disconnecting switch, inclosed in a submersible housing, for mounting on the walls of underground vaults. Both the breaker and the switch have manual operating levers interlocked so that the switch cannot be operated when the breaker is closed, or vice versa. The tank for the breaker unit has a sealing flange and watertight gasket, and the upper part of the breaker, disconnecting switch and cable-wiping sleeves are inclosed in a watertight case with removable cover. The breakers can be obtained for electrical operation. Ratings run up to and include 15,000 volts, 2,000 amp.



Submersible Unit With Oil Circuit Breaker and Disconnecting Switch; Open Position, Oil Vessel Removed

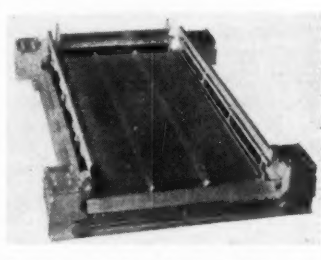
A new line of manually and electrically operated, trip-free multi-pole air circuit breakers for the control and protection of circuits in all fields also has been announced by the company. These breakers (Type AB-2) are obtainable in metal-inclosed construction with or without pull box, metal-inclosed with pull box and disconnects to permit inspection, or mounted in dead-front and metal-inclosed switchboards assembled at the factory. Ratings vary from 15 to 400 amp., 250 volts, d.c., and 600 volts, a.c. The equipment is said to have a high interrupting capacity because, as the breaker opens, the circuit is transferred to intermediate contacts and then to arcing horns by the rapid action of a magnetic blowout. Two independent overcurrent trips are included. These are: thermal inverse time trip; instantaneous magnetic trip, operating instantly on approximately ten times normal current.

Another General Electric development is a new line of circuit breakers (15, 25 and 34.5 kv.) equipped with new type oil-filled bushings, said to give the same efficient insulation and good service as higher voltage oil-filled bushings used in the past. These breakers are designated Type FHKO-339 and are designed for either indoor or outdoor service, with ratings from 500,000 to 1,500,000 kva. Utilizing the oil-blast principle of circuit interruption, the breakers operate in eight cycles.

The General Electric Co. also offers a new coated electrode for manganese welding, principally the building up of worn manganese steel castings and in the repair of fractures. It also can be used, according to the company, to obtain a manganese steel surface on ordinary iron parts.

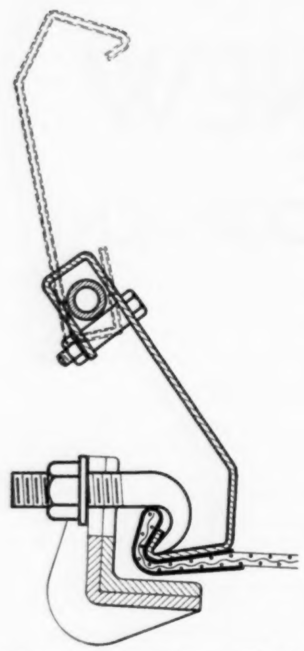
Vibrating Screen

W. S. Tyler Co., Cleveland, Ohio, offers the Type 400 electrically operated vibrating screen, for which high capacity, high efficiency, great strength, simplicity and low maintenance cost are claimed. Four electric vibrators are provided, one for each corner of the screen. The two pairs of vibrators at the feed and discharge ends are respectively yoked together by cross-armature beams, which transmit the vibration to the screen-cloth stretching and supporting structure. This method of applying power, it is asserted, provides an intensively active vibration (1,800 short, powerful strokes, each with sharp impact, per minute) over the entire screen surface, thus materially increasing capacity and accuracy of separation.



Screen With Hook Bolts Removed, Side Plates Turned Up and Screen Cloth Free

The stretching and supporting structure, according to the company, provides a taut, rigid screening surface. The rubber-covered supporting bars, it is asserted, will carry any load put on the screen, and the special hook bolts keep the screen surface in constant tension. Also, the wire cloth is not sub-



Hinged Side Plate, Showing Two Positions of the Engaging Hook

ject to racking or bending. The hook bolts, in conjunction with the hinged side plates, facilitate changing cloths and prevent the leakage of coarse sizes into the fines. It is necessary, according to the company, only to remove the hook bolts and turn up the side plates to lift the cloth out of the frame. Changing time is said to be 5 to 10 minutes.

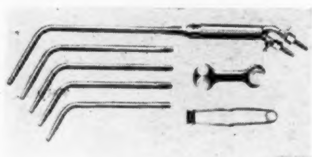
Photo-electric Control

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., offers the "Photo-Troller" for industrial use in counting, door-opening, automatic weighing and limiting purposes. The device is said to fulfill the need for a sturdy piece of equipment that can be actuated by a phototube or delicate contacts carrying only a few microamperes. The phototube or sensitive contact operates a sturdy gridglow tube, which in turn closes a contactor capable of initiating the desired operation, thus, it is said, eliminating delicate intermediate relays and insuring reliability. Units are available for any commercial voltage or frequency, with the exception of direct current. Various light sources are available for operation up to 22 ft. from the tube, and auxiliary equipment can be supplied for adaptation to a large number of machine and process applications.

Westinghouse "Photo-Troller"

Welding Torch

Linde Air Products Co., New York City, has added the Purox No. 28 welding torch to its line of oxyacetylene apparatus. This torch, it is said, can handle heavy-duty work as easily as the average job. Ten one-piece 60-deg. gooseneck tips, numbered from 6 to 15, are available for this work, and Nos. 6, 8, 10, 12 and 14 are furnished with the torch, giving it a range from 16-gage sheet iron up to heavy castings. By means of a union nut, tips can be adjusted for work in any direction. With the Purox No. 21 cutting attachment, the torch can be used for cutting steel up to 2 in. The Purox No. 28B torch is the same as the No. 28, except that it is supplied with tips No. 6, 8, and 10; mixer No. 6-10; friction lighter; and wrench. By means of an adaptor, Purox No. 11 welding torch tips can be used on both torches for light welding.



Purox No. 28 Welding Torch

Flexible Coupling

D. O. James Mfg. Co., Chicago, has developed a new flexible coupling consisting of only three parts, none of which is of a flexible nature. The center member, as shown in the accompanying illustration, is made of a non-metallic material self-lubricated from a reservoir within itself. This floating center member slides between the jaws of one metal flange on a line through the center, and is free to slide in the second flange at a direction at right angles to the first, thus making the coupling mechanically flexible without the use of flexible material.

Exploded View of Coupling

Fixing Proper Angle Of Vibrators

Universal Vibrating Screen Co., Racine, Wis., has developed the "Angle-O-Meter" for use in obtaining the proper pitch of vibrating screens manufactured by this company. The device is installed on the side members of the screen. When the screen is put in service, one end is raised until a pointer on the "Angle-O-Meter" indicates the desired degree of pitch. Thus, it is asserted, installation errors are eliminated, with resultant increase in screening efficiency.

Contents, Coal Age for March, 1933

With which is consolidated "The Colliery Engineer" and "Mines and Minerals"

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